The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Blast Furnace Hoisting Engine.

The Crane Bros. Mfg. Co., of Chicago, Ill., are the manufacturers of the automatic hoisting engine illustrated in the accompanying engraving, and which is specially designed for blast-furnace work. The first one built for the furnace of the Cleveland Rolling Mill Co. has now been in operation for nearly two years, during which time, we are informed, it has given entire satisfaction. A prominent feature of the engine consists in the fact that it is operated and controlled entirely by those at the top of the hoist, thus dispensing with the engineer usually required at the trottle of all large engines. Inspection alone will show that the different parts of the engine are strong and well proportioned, considering which, as well as the care with which the different portions have been put together, the manufacturers state that they do not hesitate in recommending it for double duty—for instance, where blast furnace stacks are close together. The hoist shown in the cut has an ample capacity for hoisting material necessary for an output of 400 tons per day. The cylinders are 14 by 18 inches, with a speed of 500 feet per minute, and the proportions of gear and pinion with the drum are made to suit the load and speed desired. The drum, moreover, can be arranged for any length of hoist. The manufacture of blast furnace hoisting engines has been a specialty of the company for almost 15 years, and they claim that one-sixth of all the furnaces in the country have adopted their engines, this undoubtedly being a sufficient guarantee of their merits. A special circular of blast-furnace engines, as well as other hoisting and coal-mining engines, giving the various sizes and duties, has been issued by the company and will be mailed on application

Cranes—A Study of Types and Details.*

BY HENRY R. TOWNE, STAMFORD, CONN.

(Concluded.)

TRAVERSE GEAR.

In this, as in the hoisting gear, good design and construction are essential to economy of power, and frequently to safety against accidents. In some types of rotary cranes no traverse mechanism exists, except an arrangement of parts which provides for the rotation of the crane. In others, such as jib and derrick cranes, provision must also be made for moving the truck or trolley horizontally on the jib, and the same provision is required for moving the trolley of bridge and traveling cranes transversely on the bridge. In all such cases a separate mechanism, distinct from the hoisting gear, has heretofore been employed, and is still sometimes desirable or convenient. When employed, its parts should be as few and simple as possible, and it should be so far independent of the hoisting gear as to permit either to be used at any time separately or conjointly. In power cranes provision should be made for accelerating the speed of the trolley travel whenever the nature of the works admits of it. The best possible result is attained when travel of the trolley is effected without varying the vertical position of the load, and without causing useless movement of the hoisting chain or rope over the sheaves through which it supports the load, which movement would involve much additional friction, and cause rapid wear of the chain or rope.

In traveling cranes a point of great importance is the parallelism of the bridge travel with the longitudinal tracks. Any defect here results in increased resistance to traction, and any considerable error might cause derailment. In traveling cranes as heretofore built the use of flanged wheels has been relied upon to prevent derailment, and the propulsion of the bridge has been effected by a transverse shaft extending the whole length of the bridge, and connected by gearing with the truck wheels supporting each end of the bridge, so that by revolving the shaft the truck wheels would be rotated, and the bridge be thereby propelled, provided the adhesion between the wheels and the rails was sufficient. In some instances, where the adhesion has not been sufficient to prevent slipping, a cast-iron rack has been laid adjacent to the longitudinal tracks and extending their whole length, and pinions, gearing into this rack, attached to the axles of the truck wheels, so that propulsion is effected independently of the adhesion of the truck wheels to the track. If the load were always central on the bridge, and the motive power always applied to this shaft at the center of its length, this plan would answer well, although it is somewhat clumsy; but in practice the load is constantly varying in position, and the motive power is applied at one end of the long traverse shaft, so that torsion of the shaft induces a considerable variation in the travel of the opposite ends of the bridge. This error is a constantly varying one, according to the portion of the load resting upon each truck, as determined by the position of the trolley, the load being never equally distributed between the two trucks except when it is exactly in the center. It follows, therefore, that this system of bridge travel, although operative, is radically defective, and that its use involves a constant loss of power by needless friction, and entails a proportionate amount of wear and tear of rails, wheels and driving gear.

A better and more simple method of bridge propulsion has lately been introduced, by means of which the longitudinal motions of the bridge are effected by pulling each of its ends, simultaneously and at equal speed, in the desired direction. For this purpose light wire cables are used, which, by a very simple and ingenious arrangement of guide-sheaves, are made to act as a "squaring device" to hold the bridge at all times perpendicular, or square, to the tracks upon which it travels. By this system the friction of traction is reduced to a minimum, and the danger of derailment from unequal travel of the opposite ends of the bridge entirely obviated.

From the above facts it becomes evident that a perfect system of bridge propulsion must hold the bridge always absolutely square with its tracks, and must propel the opposite ends of the bridge in the same direction, at the same time and at the same speed, however unequally the load may be distributed. It is desirable also that, in large cranes at least, provision be made for starting the bridge slowly from a state of rest, and then increasing the speed, and also for varying the speed while the bridge is inmotion.

CHAINS VS. ROPES, AND CHAIN-WHEEL VS. DRUMS.

In almost every type of crane the load is primarily carried upon a flexible cord of some kind. This usually consists of rope, either hemp or wire, or of chain. Each of these has distinctive merits and objections. Ropes have the advantage of being formed of many parts or fibers, so that no splicing or welding is necessary in their manufacture, and they thus have an assured and practically uniform strength throughout their length. Chains, on the contrary, consist of a series of independent links, each of which is formed from a straight bar, and welded, so that a single imperfect weld injures the whole, the strength of a chain being obviously limited by the strength of its weakest link. By care and good workmanship, however, this danger can be avoided, in which case the chain becomes as safe as the rope, and much more durable.

Where a rope is used, the hoisting gear must necessarily include a drum or barrel upon which the rope is wound up when hoisting takes place. Chain may also be thus wound up on a barrel, and this has heretofore been the common practice when chains have been employed in crane construction, and a prominent feature in cranes of large capacity has usually been a proportionately large "winding barrel" to receive the chain. A chain, however, admits of another mode of construction, which consists in substituting for the wide barrel or drum a pocketed "chain wheel," consisting of a narrow wheel or sheave, of a width only slightly greater than that of the chain, and having formed upon its periphery a series of indentations or "pockets," exactly corresponding in size and shape with the links of the chain, so that the chain and the pockets fit together accurately, and slipping of the chain upon the chain-wheel becomes impossible. It thus follows that rotation of the chain-wheel causes positive motion of the chain at a speed equal to the circumferential velocity of the wheel, in a manner precisely similar to the motion of a rack driven by a pinion, or of one spur-wheel driven by another.

To be used in this way, it is necessary that the chain should have a constant and uniform "pitch"—that is, that every link should be exactly alike—so that the distance from link to link shall be always the same (just as in spur gearing the spacing, or pitch, of the teeth must be uniform), and also that the pitch or spacing of the pockets of the chain-wheel corresponds accurately with the pitch of the chain. If this be done, and if the chain have a cross section of such area that when carrying the full load it is not strained to its elastic limit or to a degree which will cause any permanent elongation of its links, then a chain may be thus used, in engagement with a pocketed chain-wheel, as well and as safely as on a barrel. Indeed, a properly-shaped wheel of this kind is much easier on the chain than a winding barrel or drum, for the reason that the latter has a cylindrical surface, while the bearing face of the former is not cylindrical, but polygonal, the bed or bottom of each pocket being tangential to the radius at its center, and so presenting a flat surface for the parallel sides of each alternate link to bear upon. When the chain is wrapped upon a cylindrical barrel, on the other hand, the straight sides of every alternate link, being tangential to the surface of the barrel, can each touch it at one point only, the link being unsupported throughout the rest of its length, and the tendency of the strain induced by the load is to bend each of these links to the contour of the barrel. This effect may be easily seen in any chain which has been wrapped, under severe strain, upon a cylindrical barrel, unless the diameter of the barrel be very large. The spiral grooving of a barrel does not remedy this fault, although it affords a much better bearing for the chain than a plain cylinder, which latter is only permissible for small chains and light loads.

For heavy cranes hemp ropes are rarely used, owing to the size and multiplicity of parts required, and to their rapid wear. They are also inadmissable where liable to be exposed to much heat, as, for instance, in a foundry. Wire ropes are more available, and are often employed, but these also wear rapidly, unless the sheaves and barrels around which they pass are of large diameter, while this requirement, if met, reduces the effective hight of hoist and necessitates more parts or gearing to obtain the necessary purchase, and augments the bulkiness of the machine. Either material involves resort to a large winding barrel or drum. The usual and best device for large cranes is well-made chain, and this, when used with pocketed chain-wheels and sheaves, gives the best and most satisfactory results, and leaves nothing to be desired. The adoption of this plan dispenses with winding barrels, preserves the shape, and therefore the durability, of the links of the chain, and in every way simplifies and compacts the mechanism. The relative merits of the several systems may now be summed up as follows:

(1) *As to the Sustaining Cord.*

Hemp Ropes.—Admissible only for small cranes not in frequent use and not exposed to the weather or to heat.

Wire Ropes.—Available under any ordinary conditions, but involving a winding barrel of large diameter and large sheaves; not economical of space.

Chains.—Possessing, if well made, all advantages and the greatest durability; common chain, requiring a winding drum, but permitting it and the sheaves to be of smaller diameter than with wire rope; pitch chain, dispensing with a drum and admitting of the use of a narrow chain-wheel.

(2) *As to the Winding Device for Hauling in and Paying Out the Rope or Chain.*

Winding Drums or Barrels.—These must have a diameter and length such as will enable them to receive the whole length of rope or chain to be hauled in by winding it upon their surface in one coil, without overlapping. In large cranes the load is usually carried upon four, six, or even eight parts of rope or chain, so that the length to be wound up amounts to four, six or eight times the effective hoist, and the dimensions of the barrel thus become very large. Moreover, this barrel must either be caused to travel longitudinally on its shaft, so that the rope or chain, as it leads off, shall be always in the center of the crane and hoisting mechanism (which method of construction involves serious complication and greatly widens the space occupied by the gearing), or the rope or chain, as it uncoils, be permitted to vary in position from one end to the other of the barrel, in which case it is nearly always out of center, thus inducing objectionable lateral strains and causing greater friction and wear.

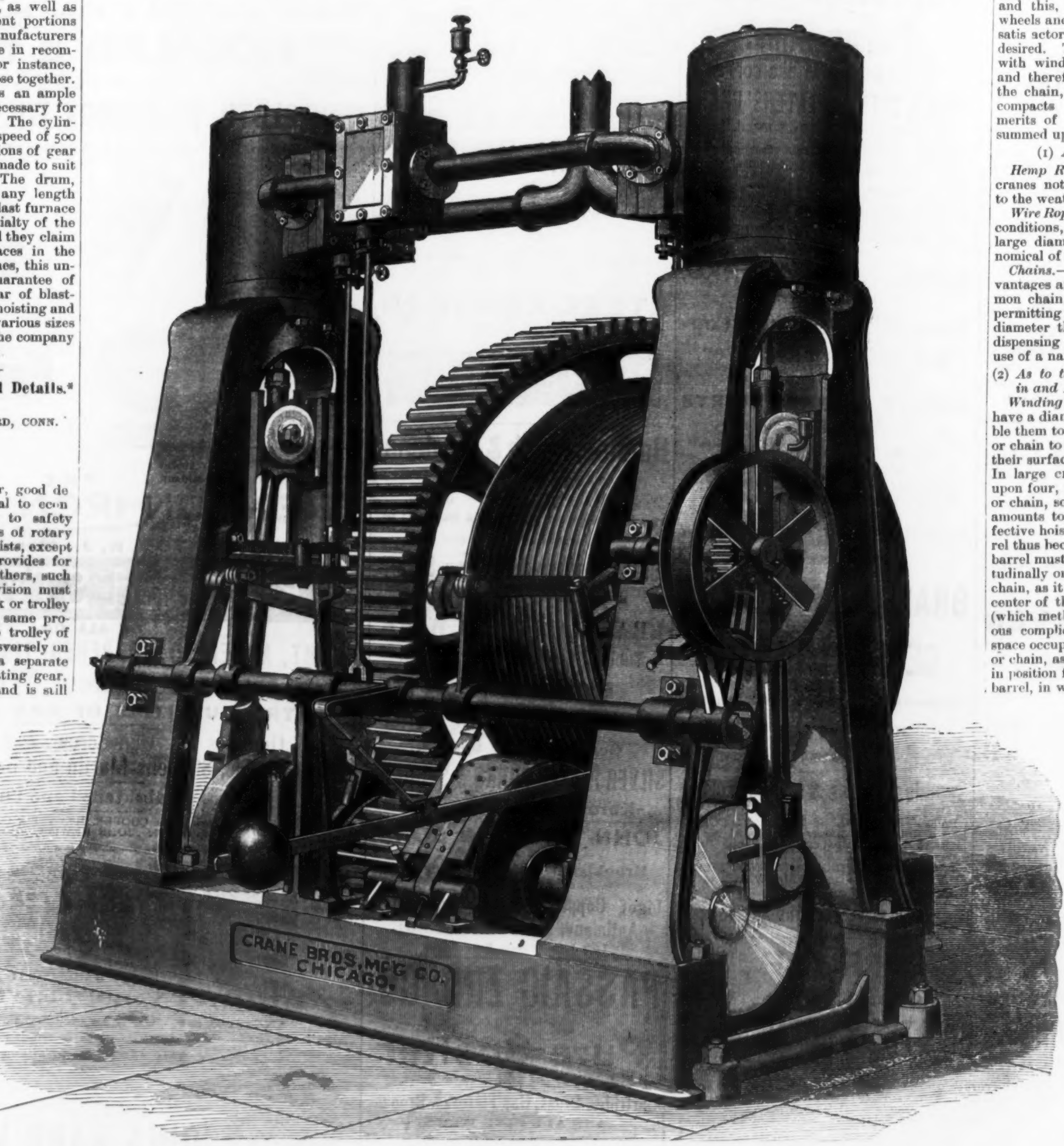
Chain Wheels, with Pockets.—These require a width only slightly greater than a single part of the chain, and a diameter merely sufficient to give the proper engagement with it, so that both dimensions become much smaller than in a winding barrel, and the total space occupied is but a small fraction of that required for the latter device. The chain-wheel is fixed in direct line with the chain, and all lateral strains are avoided, while the flat bearings afforded for the chain by the pockets preserve the shape of the link, and protect them from bending strains. The slack chain after passing over the wheel falls into a proper receptacle below.

From this analysis of the facts is deduced the proposition that chains, if well made, constitute the best form of flexible cord for sustaining the load in a crane, and that a well-constructed chain-wheel (as contradistinguished from a winding barrel) is the best form of device for hauling in and paying out the chain, and, therefore, that the best method of crane construction involves the use of these two elements.

TROLLEYS AND TRUCKS.

The trolley of a crane is the movable carriage from which the load is immediately suspended and by which longitudinal motion of the load upon the jib, or the bridge of a crane, is effected. The term truck is usually restricted to the wheeled carriage used to support each end of the bridge of a traveling crane, or the corresponding part of rectilinear cranes of all kinds. Rectilinear cranes require usually at least one trolley and one or more trucks. Rotary cranes require usually a trolley only.

The whole load of a crane is hung primarily upon the trolley, and where trucks are used, is transferred in full to them, together with the weight of the crane itself. It is desirable, therefore, that these parts should not only possess ample strength to resist the strains they may be subjected to, but also that they be so arranged that any yielding or breakage of their parts will not allow the load to fall to the ground, but only permit it



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* Read at the Cleveland meeting of the American Society of Mechanical Engineers.

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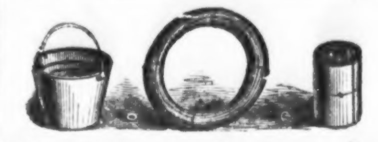

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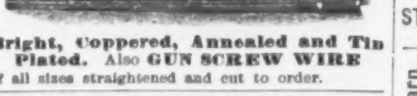

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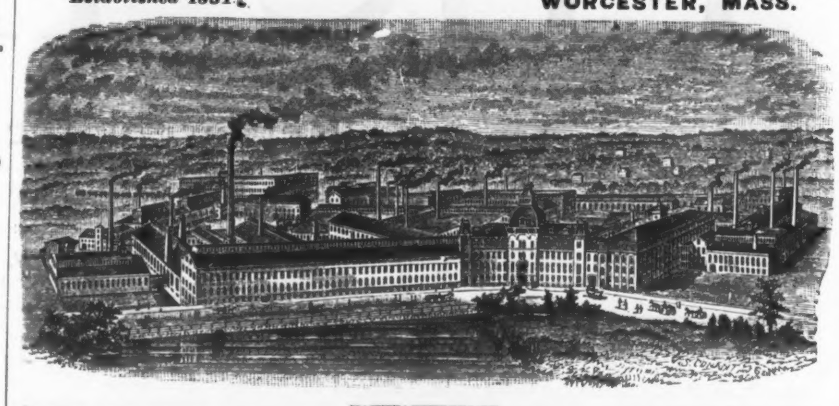

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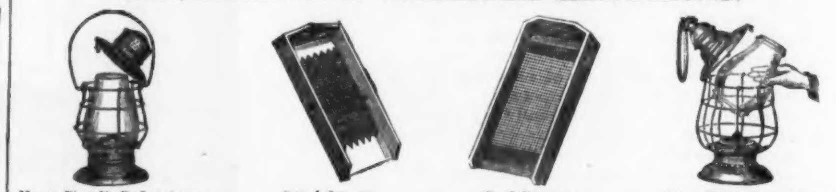

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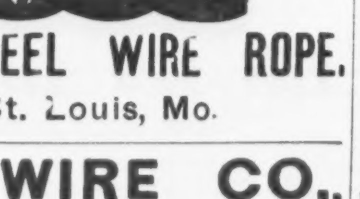

to descend until the supporting beam rests on the rails upon which the trolley or truck is to travel. For this reason the construction should be such that the ends of the bridge, in traveling and similar cranes, overlap the longitudinal tracks, and the axles or housings of the trolley, in cranes of all kinds, overlap the rails upon which it runs. It is further desirable that the vertical distance between these overlapping parts and the rails be as small as possible, so that, in the event of any break occurring, the distance through which these parts pass before being arrested is so small that no serious shock can ensue. With careful designing this distance can be reduced to merely the necessary clearance of the parts, which need not exceed more than 1 inch or less.

A natural preference exists for wrought iron rather than cast iron as the material from which to construct the moving parts of a crane, and, unquestionably, it is always best to use wrought iron for parts that are to be exposed to tension under heavy loads. Cast iron, however, is the better material for those parts that are subject to compression, and by skillful designing it is usually possible so to arrange the parts of trolleys and trucks as to use cast iron wherever stiffness or resistance to compression is required, while still employing wrought iron for the parts under tension. In this way the greatest economy is attained, and not unfrequently a better result secured than by the use of either material alone.

The wheels both of trolleys and trucks should be true cylindrically, should be double-flanged, and, by preference, should have chilled threads. If wheels of small diameter are used in order to economize hight, they should be provided with anti-fraction bushings, to counteract the increased resistance to traction caused by their small diameter. The wheel-base or distance from center to of the adjacent wheels should be as large as possible, in order to avoid cramping between the rails, and to facilitate the easy motion of the carriage upon its track. In large traveling cranes it is desirable that the axles of the truck-wheels be supported in spherical bearings, so that the wheels may adjust themselves to any yielding of the track which may result from the passage of heavy loads, and thus all unnecessary straining of the parts of the truck be avoided.

FRAMES AND GIRDERS.

In the early building of cranes, timber was chiefly used in the construction of their framework, and is still much employed in this country. Improvements in the manufacture of structural irons, and the large variety of shapes now obtainable, have, however, greatly altered the relative cost of construction in timber and iron, and made it possible to employ iron much more largely than formerly.

Experience in the practical designing and building of cranes of many types has convinced the writer that, by the proper use of materials, crane construction in iron costs, in most cases, little, if any, more than in wood. For example, the frame of an ordinary jib crane consists of three principal members—the mast, the jib and the brace. If of iron, each of these consist of a single piece of bar, or, in larger cranes, of two parallel pieces, and the union of these several members at their intersections is accomplished simply and very economically. If timber be used, on the other hand, more or less trussing is required, except for small cranes, and many bolts, washers and castings are necessary to provide for the proper bearing of one part upon the other, and to securely fasten the several parts together. The iron frame, when once properly put together, is practically imperishable. If properly painted it will not deteriorate, nor is it affected by exposure to the weather, or by extremes of heat and cold. A timber frame, on the contrary, is liable to decay, which is hastened by exposure to the weather, and it is unfavorably affected by heat. More or less shrinkage of the timber always occurs, thereby relaxing the engagement of the several parts, and disturbing the relations of the bearings which receive the strains caused by the load. The result of these changes in a timber frame is to permit more or less working of the parts one upon the other. This tends to augment the trouble from which it arises, and as a result the safety of the crane is lessened and its durability continually impaired.

So also in the bridges for traveling cranes. If the span be great, construction in timber involves much splicing, and this in turn necessitates unnecessary material in many places. The trussing and bolting requires a considerable amount of ironwork, and usually necessitates a deeper girder than is required in iron, thus lessening the available head-room beneath the crane. It is believed that an accurate comparison of the relative costs of crane frames or girders built in wood and in iron, if proportioned with an equal factor of safety throughout, would show little, if any, economy of first cost in favor of wood.

The availability of iron for structures of this kind has been greatly increased by the ability of the mills to produce extreme lengths when required. No difficulty is now experienced in this country in obtaining the heaviest channel and I-beams in lengths of 50 feet or more, and the largest angle irons are also obtainable in single lengths of 80 or 90 feet. It thus becomes possible to form each of the principal members of cranes of a single continuous iron, the advantages of which are too obvious to need description. It will be conceded that iron frames and girders are much to be preferred for every reason, with the single exception of possible economy of first cost. Taking into account, however, all of the conditions and considerations above mentioned, it is believed that the difference in first cost is so slight—in many cases not appreciable—that the frames and girders of cranes of all, except, perhaps, the smaller kinds, should now be built entirely of iron.

In conclusion, it may be hoped that the foregoing analysis will conduce to a clearer understanding of cranes, both as regards their various forms or types, and the more important details of their construction. The tendency of the day in all directions is toward the specializing of products—that is, the concentration of the abilities and resources of individual establishments upon the development of certain distinct or special products. Consumers are the ones most benefited by this condition of things, since it enables them to procure products of higher quality and ultimately at a lessened cost. Where such specialists exist, the best result is usually attained by submitting to them a clear statement of the work to be done and of the surrounding conditions, and by accepting the advice thus obtained as to the type or form of machine best adapted to meet the special requirements of the case.

In the very animated discussion which followed the reading of this paper, Mr. Thos. R. Morgan, of Alliance, Ohio, gave an interesting account of some English cranes made by Appleby, and also some cranes of his own—one being in use at the Dickson Mfg. Co.'s shop—which he had recently constructed, and which are now in use. He laid considerable stress upon the fact that the rack gearing alongside of the track, intended to preserve parallelism, was not at all necessary. He did not believe there was any great danger to the parallelism of traveling cranes when a line of shafting ran across them. Double flanges he regarded as an extra safeguard, and of worm gearing he seemed to have a very small opinion, especially where a large amount of power was to be transmitted. The crane built for the Dickson Co. has no worms, and the motive power is a square shaft running longitudinally through the building. This is 3 inches on a side, and is welded up so as to be in a single piece from end to end, and is 200 feet long. In regard to the economy of such cranes, Mr. Morgan said that they had formerly found a gang of 25 or 30 men and a foreman necessary. Naturally, the labor bill was running high, for 15 tons in a single piece was only an ordinary weight with them. When they got the crane, however, the number of laborers was vastly diminished, and a 14-ton cylinder and piston was weighed and placed upon the top of its frame with remarkable ease. The lift was some 6 or 7 feet, all three motions of the crane were running, and it was placed in 7 minutes. We understood Mr. Morgan to say that the whole was accomplished by the aid of one or two men. A very high compliment was paid by Mr. Morgan to the Frisbie clutch, which he has adopted in his machinery. Near the tension rods by which the cranes are controlled are little signs, each containing a single word. These are, "up," "down," "slow," "quick," "in," "out," "left," "right," with another for the "brake." By this means it is easy for any one to learn the management of the crane, and for orders to be given without confusion.

In the afternoon the discussion of this subject was resumed, and Mr. Durfee put upon the blackboard a drawing of a very peculiar crane, which he had designed some 10 years ago for lifting the rollers from a rail train. It was made in a very peculiar form, being a traveling crane in which one end moved on an elevated rail and the other end was supported on the floor, the crane and its bracing having a sort of ⌐ shape. The vertical part of the crane was an A or gallows frame supported on rollers.

Referring to the subject of chains, Mr. Walker pointed out the fact that, where they run over drums, the flat or horizontal link ought never to touch the barrel of the drum. The vertical link should bear on the groove and the horizontal one should be entirely clear, and he said that he thought the complaint in regard to the destruction of chains arose chiefly from the fact that the horizontal links wore on the cylindrical drum.

Mr. Collins made a sketch on the blackboard, illustrating a method by which two drums could be used where it was desirable to avoid having a spiral groove on the winding drum. Each of the drums had the same number of grooves, and were placed close together, but the chain was wound around the pair in a spiral direction, the groove on one drum coming opposite the high place on the other. Of course, there is to this plan the objection of the binding force of the chain upon the two drums, which is exceedingly destructive upon the bearings, but to obviate this a small shaft is placed between them, with a friction-wheel on the shaft bearing on the two drums, which then roll upon this wheel.

On this subject Mr. Oberlin Smith said: "It is the custom in a great many places where hoisting machinery is used to give the word of command in such terms as 'H'ist her down;' 'Now let her go;' 'Let her run a little;' 'There, now;' 'That'll do;' 'Now let her go;' 'Run her out a little;' 'Run her back;' Whoa! there!' and all such terms, sometimes in a very indistinct voice, and it is a source of danger, undoubtedly, especially with cranes where they move quickly, and there should be provided near the hoisting machine a card stating what words of command are to be given in all cases where words can be heard at all. There are cases where there is so much noise that a code of signals should be adopted, but in most cases words can be heard if they are properly spoken, and, of course, they should be sharp and crisp, perfectly plain and definite, and the same word should always mean the same thing. I know, in one of the best shops in Philadelphia some years ago, the practice was to say anything at all. A very frequent expression was, 'H'ist her away now!' My practice is to have a code of words which must be strictly adhered to—simply 'Up,' 'down,' 'in,' 'out,' 'east,' 'west,' or 'north,' south,' as the crane happens to stand, and 'stop.' Just those nine words will manage an ordinary crane. Of course, where there are more motions other words are necessary, but they can all be just as short as those; and if the workmen are allowed to use no others, and are trained in speaking distinctly and loudly, it may in some cases save accidents."

Mr. Capen said: "I should like to say, in connection with the subject just referred to by the gentleman, that it has been the practice, in instructing the operators of cranes manufactured by the Yale & Towne Mfg. Co., to take their directions from motions of the foreman or whoever may have charge of the job. There are no words used whatever. He makes his motions, up or down, as the case may be, with the hand, and a quick upward motion of the hand stops all motions. We find that to work much better than any shouting. In regard to the discussion, I am very sorry that Mr. Towne is not here to

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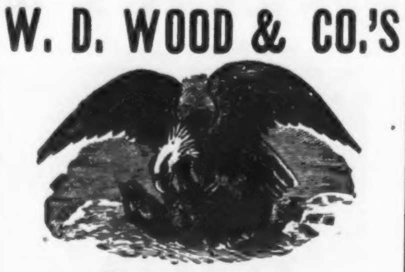
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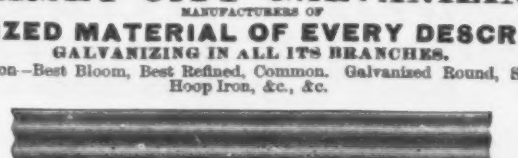
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take his side of the question. I hardly feel capable of it. I hope that you will give him an opportunity to reply in the minutes. I should like, also, to say that in preparing his paper he was very careful indeed to avoid all business discussions. I know he devoted a good deal of pains to writing a treatise as well as possible without bringing the matter of business into it."

Replying to this, the president remarked that it was generally understood that the members of the society have the privilege of so correcting stenographic reports that they can make them say what was intended rather than what the stenographer may have attributed to them. A great many men can think better sitting in a chair with a pen in their hand than they can on their feet, so that I think the rule of the society has been for them to write out their remarks made in discussion. Doubtless Mr. Towne by this rule will be allowed to make very many valuable additions to this discussion by answering the questions which were raised.

The Workshop and the Office.

It would be a safe offer to any one to say, "Show me a neat, clean and systematic workshop office and I'll show you an orderly workshop." In at least ninety-nine cases out of every hundred this would be true; the two go together in most cases. It must be said, however, that in a few exceptional cases the shop is to blame for any looseness rather than the office. A shop will often go along under what might be called a slipshod system, or without any system at all, and do so for a long time, provided competing shops conduct their work in the same way. Some day, however, they wake up to find their products undersold in the market, and in due time comes a conference in the office as to what is best to be done to cheapen production. The manager does not see how the office expenses can be lessened, and usually the financial man will not listen to a reduction of the advertising list. The superintendent does not see how wages can be much reduced, the buyer is prone to think that better figures cannot be obtained, and, finally, there does not seem to be room for improvement in any direction. So the first conference always comes to naught. Perhaps it is wrong to say comes to naught, because it is the first step, or, in other words, there has to be a first conference in order to demonstrate that the head of each department is clearly of the opinion that the inevitable change must be made in the other departments, or at least that there is no room under existing conditions for any important changes in his department. Then comes the second conference, in which it is made to appear that the fault lies in the tools, machinery, &c.; they are not of the newest design, not suitable for a systematic or rapid production, require skilled workmen to operate them, and cannot be expected to compete with a brand-new establishment having automatic machines, with jigs and fixtures for every piece of work, and one man running three or four machines. Finally, it is determined to change the shop system as fast as funds will allow, getting new tools and all the workshop appliances necessary to manufacture the work in quantities rather than to make it in a general machine-shop manner.

The manager, having forced this conclusion upon the heads of departments and upon the foremen, calls upon them for their suggestions as to what changes are to be made, and how best to make them, supposing, of course, that those found skillful enough under the old system will prove equally skillful under the new one. There may, of course, be instances where this is the case, but it is almost as rare as angels' visits, because even the barest equipment of a machine shop containing the lathe, the planer, the shaper, the drilling machine and the slotting machine affords a wide field for the employment of jigs and other appliances for any job that is done over and over again, and if these have not been made, and the work has been done under the separate measurement and individual chucking by trial for each operation, it is not very probable that those who were content with this system are experts at designing and applying such labor-saving devices. As a consequence, the office is deluged with applications for new machines and new tools, and, although the office well understands that a new lathe will be better than the old one, and the same with regard to a new drilling and a new planing machine, yet changing an old machine for a new one does not appeal to one as much of a move in the direction of changing a system of manufacture. Some of these changes are generally made, materially reducing the balance in hand that has been appropriated to change the workshop system.

The cost of the work is found to be reduced but a trifle, and the manager begins to scrutinize each demand for new machines and new tools. Finally, he canvasses the question with all the good mechanics he knows or comes across, and eventually concludes to employ some good man brought up under the manufacturing system. This new man in due time comes to inspect the shop, is introduced to the various foremen (who have not the least idea of the object of his visit), looks over the shop, and finally gets back to the office after the men have left for the day. He tells the manager that the whole system is wrong from head to foot, that the work must be costing three or four times too much, that in one day's inspection he has not had time to determine even where to begin the reorganization, that he could begin anywhere at hazard and carry the improvement forward from that point, but that the only satisfactory way is to begin at the beginning, lay a proper foundation, and then proceed upward. He is probably asked to give some example of the kind of improvements he sees necessary. He hesitates a moment, and finally says:

"Well, you take the bars of steel you make your dies of, and cut them off one at a time in the blacksmith's fire. Two men, the blacksmith and helper, wait while it gets hot, and then cut it off and square up the edges. They go to the planer and are planed up to as near the same dimensions as the planer can measure with his scale. Now, suppose you put the bars of steel in a cutting-off machine that a boy can work, and you may cut off six at once, and they will be the right length at once. Your cutting-off

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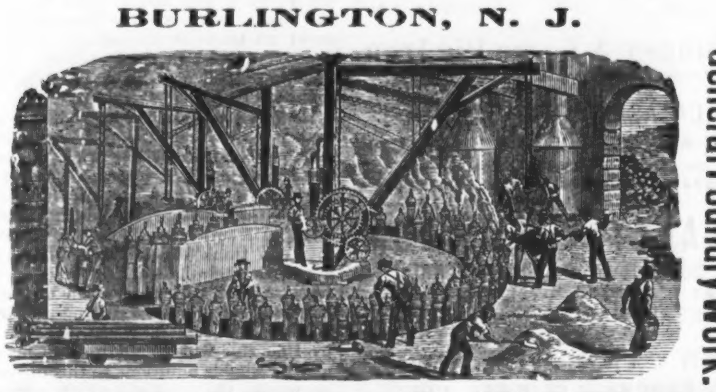

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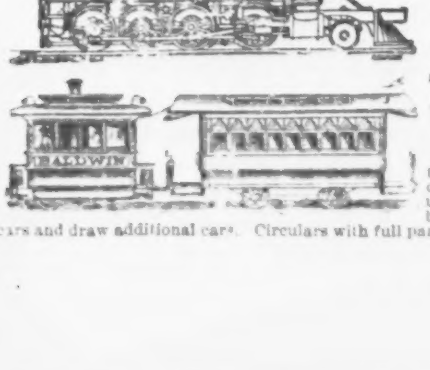

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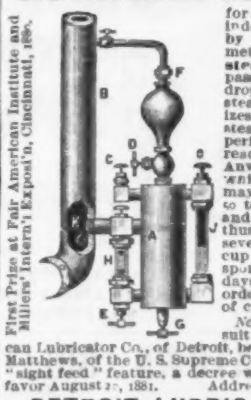

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This looks like business, and after another hour's talk comes the question:

"Well, how much do you think it will cost to make all the changes you think imperative to get us fairly started under the new system?"

Now, this is a very awkward question to answer, because the anxiety on this point evinces alarm and a fear that the sum will be beyond reach. The man cannot, in any event, give more than a guess, and is induced to give his lowest guess, which, nine times in ten, seems enormous to the principal, and the final determination is to begin anyhow and carry the thing out as far as funds will go.

At this point the trouble really begins, especially if the new man is not a good hand at explaining his reasons for the changes he is about to make. To take an example, he goes to the office and says:

"I want a new 10 inch, three-jawed chuck for such and such a machine."

"A new chuck for that machine! Why, we bought a new four-jawed chuck for that very machine less than three weeks ago."

"I see you have a new one," is the reply, "but it is a four-jawed—I want a three-jawed."

"Well, but why won't the four jaws answer?" is the next question.

"Because four jaws are all very well for work that has been turned up, for then all four jaws will grip the work, but for rough work that is not true, only two, or maybe three, jaws will grip, and then not with an equal pressure, so the work will not be held either firmly or true. In a three-jawed chuck all the jaws must grip, and that with an equal pressure; hence the work will be held firmly as well as true."

"Then the four jaws won't do, eh?" says the manager.

"They will not," says the new man.

"All right, as it is necessary, you shall have your chuck," says the manager, "and don't forget that when I ask you questions of that kind I only want to know the reason, so that I can see my way clear."

But suppose the man simply knew that the new chuck was necessary, and could not explain why, then the case would have been entirely altered, for, there being no apparent reason offered for the change, it would appear simply as unnecessary.

Some men, indeed, seem to think that it is essential to make changes of some kind. Indeed, I have now in mind two cases in which new foremen were at a loss what to change, and after due consideration one changed the position of the grindstone and the other that of the clock, and that was all the improvement either of them found himself capable of inaugurating. When a firm have determined upon a change of system it is not sufficient for the reorganizer to simply say, "I want so and so, and so and so, done," because, let him be as good a man as he may, he has not as yet proved to that firm that he cannot make mistakes, or that every new expenditure he desires to make is an absolutely essential one and the best one to make under the conditions. Too many seem to think that it is sufficient that they who are hired because they are supposed to know, say that so and so is necessary, forgetting that the principal or proprietor has everything at stake and is in the hands of a man who has shown his ability and gained reputation in some other shop, and not in this one, and therefore not under the same conditions. On the other hand, many managers forget that a change of system from making piecemeal to manufacturing in gross means a change from lathes, planing and shaping machines to monitor lathes and milling machines; so much so, indeed, that one may form some idea of how much change has been made by simply asking, "How many less shaping machines, planing machines and lathes have you than before, and did you have any milling machines, edging machines or turret lathes before, and how many have you got now, and how many tool makers did you have and have you now, and, finally, what has been the comparative employment of emery-wheels under the two systems?" for, although change is not always improvement, yet these changes are inevitable if making is to be supplanted by manufacturing.—*Mechanics.*

Burglars' Hardware.

In two large glass cases at Police Headquarters in this city are displayed hundreds of implements which have been used by burglars in making their way into dwelling-houses and stores. There are implements with which robbers exert great force in breaking open heavy doors and shutters and in wrenching off the hinges of safes. Much noise is necessarily caused in their use. There are others which are used so silently that with their aid a burglar can enter a room where persons are sleeping without making an alarm. For heavy work the "jimmy" is a favorite tool of the burglar. It is a modified iron crowbar, often made in sections in order to be more convenient for carrying on the person. The ends are made of the finest steel, usually wedge-shaped or chisel-shaped, but frequently having sharp cutting edges. With two or three large sectional jimmies thieves can open the strongest of store shutters and doors. Burglars' tools are made of the best materials, and the mechanical workmanship displayed in them is of the best. Most of them can be used readily as deadly weapons of offense and defense. Several of the best jimmies at Police Headquarters were made by Adams, alias Moore, the bank burglar, now in prison. Other implements made by him are fine diamond-pointed drills, bits and braces. Persons who rely on iron bars, set across the basement windows of their houses to keep out thieves would be astonished by the working of "dividers," long screw bolts on which are nuts attached to hooks. A few turns of the bolts, by means of a lever, will spread bars far enough apart to permit a man to enter. When robbers wish to open doors without breaking them, they often use pick-locks or skeleton keys, of which there are many specimens at Police Headquarters. Keys left in locked doors are turned from the outside easily with a pair of slender pincers called "nippers." Occupants of houses can protect themselves against the use of such implements, however, by a simple device recommended by the detectives. A piece of strong wire, about a foot long, bent over the handle of a door and passed through the ring of the key, will make it impossible to unlock the door from the outside. Burglars laugh at the fastenings of windows which are not guarded by strong shutters. On windy nights they quickly cut out pieces of glass near the fastenings, using a piece of putty to deaden the sound and to keep the glass from falling inside the window. The noise made in the operation will not waken a light sleeper. Large pieces of wooden shutters are removed by the use of fine augers and greased saws. When proper openings are made the thieves can remove ordinary window fastenings, and even heavy cross-bars, without arousing the inmates of a house. In the collection of articles used by thieves also are dark lanterns, face masks, pistols and knives, leaden mallets, rope ladders, bits and braces, and many tools commonly used by carpenters and machinists.

NEW PUBLICATIONS.

ABSTRACT OF THE PROCEEDINGS OF THE SOCIETY OF ARTS. TWENTY-FIRST YEAR. MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

The volume before us includes meetings from No. 288 to 303. The subjects covered are interesting, and the way in which they have been handled and the reports made are exceedingly valuable and worthy of the greatest praise. A good and short report of a long paper or long discussion is one of the most difficult things to write, and the uniform excellence of these reports shows the highest skill on the part of both reporter and editor. We notice one very interesting report of a discussion by Mr. Hamilton A. Hill on the Cummer engine. Mr. Hill speaks of it as more nearly approaching perfection in high piston speeds, simple details, perfection of workmanship and automatic cutting off than any other engine now before the public. In noting the different parts, he remarked the slight friction even in 100-horse-power engines, where the eccentric is 4 inches in diameter, with only 2¼-inch space. Mr. Porter, at the 291st meeting of the society, read a paper on some of the principles involved in the construction of high-speed steam engines. It gives an interesting history of the Porter-Allen engine, and the gradual spread of the high speeds among engine builders. There was also an elaborate treatment of some of the limitations and the method of obtaining the requisite rates in the reciprocating parts.

A TREATISE ON EXPLOSIVE COMPOUNDS, MACHINE ROCK DRILLS AND BLASTING. By Henry S. Drinker. Published by John Wiley & Sons. Quarto; 10 x 12 inches in size; 400 pages, with illustrations and folded plates. Bound in cloth. Price, $5.

Mr. Drinker is favorably known to the engineering profession as the author of a work on tunneling, first issued in 1878 and recently republished in an enlarged edition. The present volume is a continuation of the work commenced in the first-named treatise, bringing the special subjects to which it is devoted fully down to date. The work now issued is in some respects a rescript of those portions of the original work which were devoted to explosive compounds, rock drills and blasting. It is likely to be of great service to students of engineering, and to engineers who desire to investigate those subjects without going into that fuller consideration of the principles of tunneling which are necessary to the engineer or contractor actually engaged in tunneling construction. There is no other full work in English on these subjects, although many valuable monographs and papers, especially on explosive compounds and on the phenomena attendant on explosion and detonation, have appeared within the last decade in pamphlet form. The work is comprised in six chapters, the titles of which will afford an adequate idea of its general scope. The first is, "A History of Rock Excavation, Tunneling and Blasting from the Reign of Rameses II to the Present Time." Following in succession are, "A History of Explosive Compounds, Rock Drilling and Blasting;" "Explosive Compounds;" "Principles of Blasting;" "Air Compressors and Machine Rock Drills;" "Machine Rock Drills, their History and Characteristics;" and "The Application of Machine Rock Drills and High Explosives in Modern Tunneling." In the latter chapter the history of various prominent tunnels is given, among which may be mentioned the Hoosac, the Sutro, Mont Cenis and St. Gothard tunnels. The book is copiously illustrated throughout.

STATISTICAL TABLES OF AMERICAN WATER WORKS. By J. J. R. Croes. Published by the Engineering News Publishing Co. Size, 6 x 9 inches; 113 pages. Price, $1.

These tables, which have been compiled from special returns, formed part of a paper entitled "The History and Statistics of American Water Works," read before the American Society of Civil Engineers some time ago. The compilation embraces two tables, the first of which contains the names of 793 places in which it is known that water works are in operation or which are now in course of construction. They are given in alphabetical order, with the source and mode of supply, cost of the works and the names of the principal officers. The sources of supply are classified as lakes, rivers, surface water, springs, artesian wells and ground water. All the information given in these tables was derived from special returns, made either by officers of the works or residents of the towns, except the names of some builders of pumping machinery, which were obtained from a table prepared by the Holly Mfg. Co. in 1878. It is perhaps needless to state that the collection of the facts summarized has been a task of considerable difficulty, and in view of the interest attached to them, cannot but meet with a good deal of appreciation.

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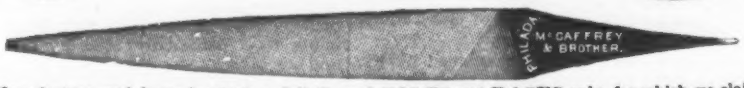

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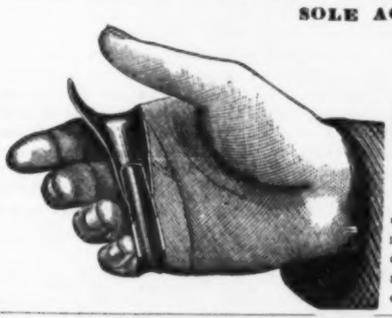

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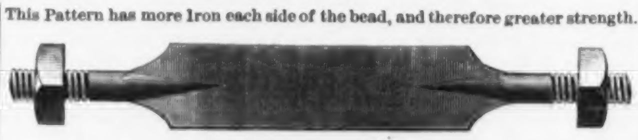

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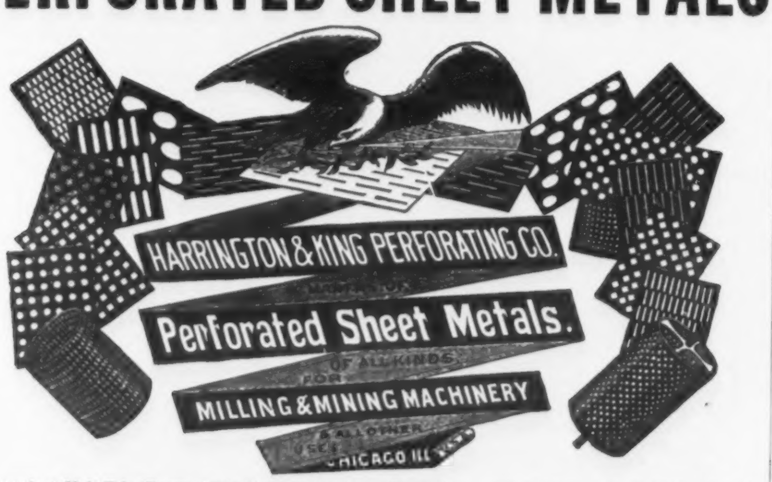

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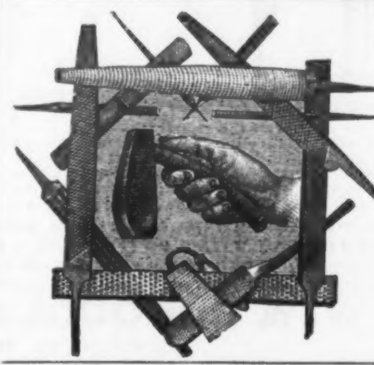

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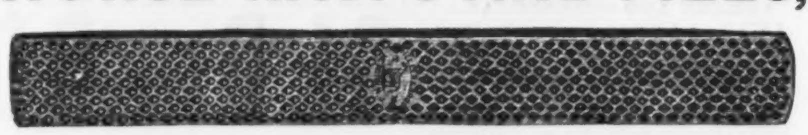

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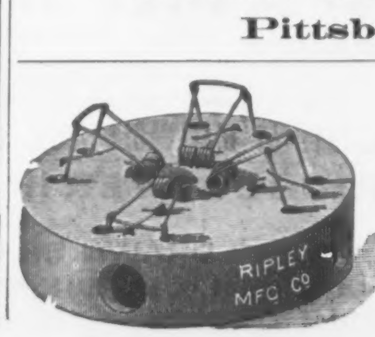

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American Counting-Room

American Counting-Room is the name of a monthly magazine devoted to business topics, the first number of which appeared in July. It succeeds a sprightly fortnightly magazine called the *Bookkeeper*, which has been published for several years by the same parties who now put forth the *American Counting-Room*. The field which the *Bookkeeper* attempted to cover, being that of business methods, counting-room practice, finance and kindred interests, proved larger than the title of the periodical, and the change which has taken place has been solely to adapt the journal to the work that is presented. The July issue contained an illustrated description of the new Produce Exchange Building, of this city, presenting a fine engraving of the front of the building, together with floor plans showing the several divisions of the building for business purposes. A department called "Counting-Room Chats" contained a number of communications from practical accountants and business men upon topics of interest to all engaged in office work. A number of interesting articles from able writers on commercial and financial topics are presented, together with a summary of leading commercial events for the month, business embarrassments and a department of editorial note and comment. The magazine is about the size of the *St. Nicholas*, is presented in a handsome cover, and is well calculated to interest business men and office employees.

RAILROAD ENGINEERS' PRACTICE. By Thomas M. Cleeman. Published by the Engineering News Publishing Co. Size, 5 x 7½ inches; 139 pages; illustrated. Price, $1.50.

Mr. Cleeman's little book will undoubtedly meet with a very favorable reception, embracing, as it does, a considerable amount of practical information in a compact and readily accessible form. The author has divided the subject into a number of principal divisions, many of which are again made up of subdivisions, varying according to the projected classification of material. Thus we find the matter distributed under the heads of Preliminary Survey, Location, Construction, Culverts, Arches, Retaining Walls, Tunnels, Bridges, Masonry, Foundations, Pile-Driving, Track-Laying, Switches, Cross-Ties, Rails, Stations, Telegraph Lines, &c. It will be seen that these, when properly handled, will give the reader a very good idea of the nature of the work, the calculations to be performed, and execution. Though the method pursued may in some instances be pronounced very elementary, this can scarcely be considered an objectionable feature. We would venture to suggest, however, that the addition of further engravings might prove advantageous, and in connection with the portion relating to the adjustment of instruments, we feel confident that explanatory cuts would be of unquestionable value. Even in its present shape, however, the work will be appreciated and very probably meet with a ready sale.

AMERICAN COTTAGES. Consisting of 44 large quarto plates containing original designs, together with form of specification for cottages. Published by William T. Comstock. Price, $5.

This volume, which is one of the latest additions to the literature of architecture, comprises original designs of medium and low cost cottages, seaside and country houses. There are also presented a club-house, a school-house and a seaside chapel. The specification is specially adapted to the construction of cottages and low-price houses. The designs are in prevailing styles and from drawings of a number of prominent architects. Nineteen authors' names appear in the list in the front of the book. Their residences, however, are comprised in a much smaller number of towns. We notice New York, Brooklyn and Albany in this State, and Newark, Elizabeth and Princeton in New Jersey. The designs are shown mostly by perspective views, elevations and plans. Details are given in only one or two cases. The plates are photo-lithographic reproductions from authors' originals, and the scale varies according to the size of the original and the necessity for adapting the plates to the limitations of the page on which they are printed. The buildings shown have in some cases been actually erected, and memoranda of their locations appear in the plates.

ARCHITECTURAL FOLIAGE ADAPTED FROM NATURE. By Joseph Barlow Robinson sculptor. Published by J. O'Kane. 36 quarto plates. Price, $3.

This is a collection of plates in portfolio cover, the plates measuring 10¾ x 12¾ inches. The selection comprises designs for capitals, bosses, crockets, finials, diapers, corbels, &c., adapted to the enrichment of buildings, monuments, furniture and the like. It is one of those portfolios of designs which artists and mechanics in various lines find valuable as a companion to their work. The plates are lithographic, and the execution is very good. The contrast of light and shade is fully up to the average of works of this character.

HAND-SAWS—THEIR USE, CARE AND ABUSE. HOW TO SELECT AND HOW TO FILE THEM. By Fred. T. Hodgson. Published by the Industrial Publication Co. Size, 5 x 7 inches; 96 pages; 75 engravings. Price, $1.

This book, as the auther very plainly states in his preface, is mainly a compilation and adaptation of other works which have preceded it. He gives a list of the books to which he has been indebted, among which may be mentioned Wilkinson's "Egyptian Antiquities;" Beckman's "History of Inventions;" Worssam on "Mechanical Saws;" Holtzapffel's "Turning and Mechanical Manipulation;" Knight's "Mechanical Dictionary;" "Encyclopedia Brittanica;" Richards's "Wood-Working Machinery," and "Grimshaw on Saws." He also mentions several of the current mechanical journals as being sources of information. An idea of the scope of the work can be as well conveyed by mentioning the chapter headings as by any other plan. They are as follows: "History of the Saw;" "Philosophy of the Cutting Qualities of Saw-Teeth;" "How to Use Hand-Saws;" "Filing and Setting Hand-Saws;" "The Use of Miscellaneous Saws;" "Remarks on Files, Sets and other Appliances," and "Memoranda on Saw Gauges, Miter Boxes, &c." This work has been carefully prepared by a practical author, and aside from the fact that the illustrations are very inferior, being reproductions from indifferent originals, it is a desirable handbook for use by amateurs and apprentices. The practical carpenter and builder are likely to obtain many hints from it, which, applied in his every day business, cannot fail to be of advantage to him.

PRACTICAL GUIDE TO SCENE PAINTING AND PAINTING IN DISTEMPER. By F. Lloyds. With illustrations drawn by the author. Published by Jesse Haney & Co. Pamphlet cover; size, 7 x 10 inches; 90 pages. Price, $1.

This is a cheap American edition of a somewhat expensive English work that has enjoyed a considerable measure of popularity in this country. The original work, if we mistake not, retails for about $5. The reprint is quite as handsome as the original edition, and, although it is classed as a cheap work, it is in clear type, with adequate illustrations and printed upon good quality of paper with wide margins. In the book directions are given for all the implements and materials required in scene painting, including the construction of scaffolding, or, rather, the "painting bridge," as it is called. Directions with reference to the use of colors are also contained, and instructions for the preparation of canvas are given. These directions precede the actual work of delineating the design upon the scene. The work is practical in all particulars, and cannot fail to interest those who have occasion to seek information of this general character.

Coal Production in France.

Statistics recently published and relating to the working of the coal mines in the Pas-de-Calais, France, show that during the year 1881, 51 mines were worked in this department, and the quantity of coal produced shows a steady increase, having been in 1879, 4,175,573 tons; in 1880, 4,844,323 tons, and in 1881, 5,320,390 tons. During 1881, of the 24,538 persons employed in these mines, 679 were injured, more or less severely, and 35 met their deaths, or one death by accident to every 701 workmen; one accident was exceptionally serious, having resulted in the loss of eight lives and injury to one person. The average cost of raising the coal was 10 francs 25 centimes (about $2.05) per ton. In the department of the Nord, 46 coal mines were worked in 1881, being the same number as in the previous year; the output of coal was 3,671,702 tons, or a decrease of 29,887 tons, as compared with 1880. The quality of this coal is superior to that of the Pas-de-Calais. In the coal mines of the Nord the number of workmen employed above ground was 4675, and underground, 16,026; the wages paid amounted to over 20,000,000 francs. There were 11 deaths from accidents in 1881, or one death to every 1889 workmen, against a proportion of one to 1721 in the previous year, and one to 812 in 1879. No special information is published regarding these accidents. No iron mines were worked in the Nord during 1881, and in the Pas-de-Calais, among the deposits of ironstone of the Boulonnais, that of Outreau alone was worked; it afforded employment to 142 men, and yielded 51,000 tons of raw ore; these, together with 30,000 tons which had previously been mined at Marquise, passed through the works, and gave 39,000 tons of dressed ore, containing on an average about 54 per cent. of iron. In the Pas-de-Calais the blast furnaces of Marquise and Outreau produced 56,500 tons of pig iron in 1881, and the works of St. Laurant, which recommenced work at the end of the year, produced a small quantity of merchant and special iron.

TRADE PUBLICATIONS.

Air Compressors.

The Morris County Machine and Iron Co., of Dover, N. J., have just issued a catalogue describing their new high-speed air compressor, and containing matter of general interest to those using this class of machinery. Sectional views of the compressor, and also indicator cards, are submitted, and contribute greatly to the appearance of the publication.

Economist Plow Co.

We are in receipt of a circular issued by the Economist Plow Co., bearing date of July 1, 1883, giving the special reasons for the construction employed in the Economist plow and the advantages gained thereby. The special feature to which attention is directed is the construction of the share, which is divided into two parts, the point or nose being separate from the wing or cutting blade. Each part is bolted directly to the standard, which permits of the removal of the nose, which wears out quickest, without disturbing the wing, and *vice versa*. The special advantage claimed for this construction is the material saving in the cost of repairs, and the manufacturers rely upon it as one of the greatest selling features of their goods. A very careful description is also presented of the construction incorporated in the plow named, whereby greater durability and better working service is obtained than in other articles with which it is in competition. The works of the Economist Plow Co. are situated at South Bend, Ind.

New Methods of Lubrication.

We have received from Mr. A. E. Barthell, New York, sole licensee and manufacturer of the Reisert, Stauffer & Tovote patent lubricators and patent solidified oil, a pamphlet describing the goods above indicated. As a specimen of color printing, it is one of the handsomest we have ever seen, and is altogether unique. The production is from the lithographic establishment of Messrs. Sackett, Wilhelms & Betzig, of this city. The cover has several distinct shades of color upon it, in addition to bronze *fac similes* of medals and bronze stars upon a flag, and bronze lettering. The colors are judiciously arranged, and so blend as to make it at first sight seem impossible of production by the ordinary process of printing. In the inside of the work still more remarkable color effects are shown. Full-size *fac-simile* representations of the fixtures used in the different systems above named are given, and so closely is the appearance of glass, brass, bronze and oil imitated that it is difficult to believe in some cases that one is not looking

at the actual articles instead of pictures of them. The representation of the Barthel lubricator on page 9, and also the connection tube for Reisert and Stauffer lubricators on the same page, are particularly happy in these features. The blending of colors and the effects produced by the bronze are certainly better than anything we have before seen.

SCIENTIFIC AND TECHNICAL.

Utilizing Ashes.

Mr. J. A. Shinn has obtained a patent for the use of ashes in making mortar. It has been found that the fine portion of domestic ashes is capable of being converted, with a small proportion of lime, into a mortar having, when a month old, a tensile strength of from four to five times that of common sand and lime mortar, or about 80 pounds per square inch. Sand-mortar a month old has a tensile strength of 20 pounds Ashes and lime, mixed as béton, gives a tensile strength of 140 pounds and a crushing strength of over 1100 pounds per square inch. It will thus be seen that, by utilizing the ashes for mortar, a large part of the expense of removal could be saved, together with the whole cost of procuring sand for that purpose, and, at the same time, a very superior article of mortar be produced. In consequence of the small quantity of lime required (10 per cent.), it would be necessary to mix the mortar by machinery at a mill and deliver it ready for use. This practice prevails to a great extent in European cities on account of the superiority of milled over hand-made mortar. Ash-mortar has the additional advantages of resisting the action of water as soon as it has set (in from two to three days), and also the combined action of fire and water, the quantity of lime being so small and the chemical union with the ash so complete that the application of heat does not produce free oxide of lime, as in the case of sand-mortar, and consequently does not swell when water is applied to the heated mortar. The weight of ash-mortar is about one-half that of sand-mortar when both are dry, and it works soft and smooth. Ash-mortar forms, when set, a silicate of lime and alumina, and hardens uniformly throughout, like cement; while sand-mortar, when set, is but an imperfect carbonate of lime, the sand furnishing the nucleus around which the carbonate forms. Ashes made under steam boilers, or in other fires where a high degree of heat is maintained, are not suitable for mortar, owing to the chemical change which takes place in the fire, the finest part of such ash, that found behind the bridge-wall of the boiler, being found to be of the same nature as the coarse clinker, having no special affinity for lime, and being only fit for combination with cement or plaster.

A Liquid Voltaic Cell.

In the ordinary voltaic element, two solid plates are acted on unequally by one or more liquids. Mr. F. W. Clarke, an American electrician, has devised a cell of three non-mixable liquid strata and no solid plates. In a small weather glass, layers of mercury, dilute sulphuric acid and a solution of iodine in ether were placed. Upon connecting the uppermost and lowest layers with insulated wires, and introducing a galvanometer into the circuit, a considerable current is indicated. The experiment is interesting, but such an arrangement is hardly a practical battery. Under certain conditions, however, it might yield a constant electro-motive force.

A New Explosive.

Herr Koppel, a German chemist, has brought out a new explosive substance, which he expects to be less costly than any other, to give out no injurious fumes, and not to be liable to explosion by shock or friction. The following figures give the composition of two kinds, the first of each pair of figures relating to explosives suitable for hard rocks, such as basalt, and the second of each pair for softer, such as sandstone:

	No. 1.	No. 2.
Saltpeter	35	42
Soda	19	22
Sulphur	11	12.50
Sawdust	9.50	10
Chlorate of potash	9.50	....
Charcoal	6	7
Sulphate of soda	4.25	5
Prussiate of potash	2.25	....
Refined sugar	2.25	....
Picric acid	1.25	1.50
Total	100	100

The First Electric Telegraph.

According to *Engineering*, the idea of the practical application of the electric telegraph to the transmission of messages was first suggested by an anonymous correspondent of the *Scots Magazine* in a letter dated Renfrew, February 1, 1753, signed C. M., and entitled "An Expeditious Method of Conveying Intelligence." After very considerable trouble Sir David Brewster identified the writer as Charles Morrison, a native of Greenock, who was bred a surgeon, and experimented so largely in science that he was regarded in Renfrew as a wizard, and eventually found it convenient to leave that town and settle in Virginia, where he died. Mr. Morrison sent an account of his experiments to Sir Hans Sloane, the President of the Royal Society, in addition to publishing them anonymously, as stated above. The letter set forth a scheme by which a number of wires, equal to the letters of the alphabet, should be extended horizontally, parallel to one another, and about one inch apart, between two places. At every 20 yards they were to be carried on glass supports, and at each end they were to project 6 inches beyond the last support, and have sufficient strength and elasticity to recover their situation after having been brought into contact with an electric gun-barrel, placed at right angles to their length about an inch below them. Close by the last supporting glass a ball was to be suspended from each wire, and about a sixth or an eighth of an inch below the balls the letters of the alphabet were to be placed on bits of paper, or any substance light enough to rise to the electrified ball, and so contrived that each might reassume its proper place when dropped. With an apparatus thus constructed the conversation with the distant end of the wires was carried on by depressing successively the ends of the wires corresponding to the letters of the words until they made contact with the electric gun-barrel, when immediately the same characters would rise to the electrified balls at the far station. Another method consisted in the substitution of bells in place of the letters. These were sounded by the electric spark breaking against them. According to another plan, the wires could be kept constantly charged, and the signal sent by discharging them. Mr. Morrison's experiments did not extend over circuits longer than 40 yards, but he had every confidence that the range of action could be greatly lengthened if due care were given to the insulation of the wires.

Egyptian Lamps.

Among recent acquisitions by the South Kensington Museum may be mentioned four enameled glass lamps for suspension in mosques, which were obtained on loan for the museum from the Khedive himself. The Arab Art Museum, in the mosque of El-Hakim at Cairo, contains more than 80 of these lamps, including more than a dozen duplicates. It was from these duplicates that permission was received to select the four which are now exhibited at South Kensington. They are fine specimens of their class; the coloring of one is especially beautiful, and they all belong to the best period of Arab work. Three of them bear the name and titles of Sultan Hassan (who reigned A. D. 1347–51, and again 1354–61), and came from his great mosque in front of the citadel, and the fourth has the title of El-Melik Ez-Zahir Barkuk (1382–99), the founder of the dynasty of Circassian Mamelukes which succeeded that of the Turkish Mamelukes, to which Sultan Hassan belonged. The colors of the enamel are chiefly cobalt and a dark red, with touches of white and pale green. An incomplete sentence from the Koran runs round the necks of three of them. It is appropriately taken from the Chapter of Light (xxiv.), and reads: "God is the Light of the Heavens and the Earth. His light is as a niche, in which is a lamp; the lamp is in a glass; the glass is, as it were, a glittering star," &c. The Moslems are almost as fond of this verse as they are of the celebrated Ayat El-Kursi, or "Throne-verse," which meets the eye in almost every mosque and tomb in Cairo.

Boiling Points of Saline Solutions.

The boiling point of any liquid is not affected by foreign bodies so long as these do not chemically combine with it. Thus, stones, masses of metal, &c., would not have any effect on the boiling point. A great number of salts, however, do combine chemically, thus raising the boiling point, as shown in the appended table, which gives the boiling points of saturated solutions. Of course, by solution, any temperature between 212° (the boiling point of the solvent, which in this case is water) and that given in the table may be obtained. It should be here observed that the vapor found at the surface of a saline solution is that of pure water, and has a temperature of 212° at atmospheric pressure, although the temperature of the solution itself may be much higher. Thus a saturated solution of common salt boils at 227°, but the steam has a temperature of 212° only:

Solutions.	Temperature of ebullition.—Degrees.	Weight of salt in 100 lbs. of water.—Pounds.
Chlorate of potassium	219.56	61.50
Carbonate of soda	220.28	48.50
Phosphate of soda	221.9	113.30
Chloride of potassium	226.94	59.40
Common salt	227.12	41.20
Neutral tartrate of potassium	238.40	296.20
Nitrate of soda	249.80	224.80
Acetate of soda	255.90	209.00
Carbonate of potassium	275.00	205.00
Acetate of potassium	336.20	798.20
Chloride of calcium	355.10	325.00

A circular issued in connection with the proposed Industrial Exposition at Pittsburgh says that railroad supplies form no small item among the industries of Pittsburgh, six establishments being devoted to the manufacture of locomotives, cars, springs, car-wheels, rails, rail fastenings, and the numerous articles required by the railroads, including iron-bridge work. The Pittsburgh capital invested in these pursuits in 1882 was $1,435,000, employing 1102 hands, yielding a product that year valued at $3,177,817. This included 144 locomotives, 500 freight cars, 12,282 tons finished springs, railroad axles, steel forgings, &c., 5000 tons of castings in car-wheels, and a large amount of supplies, locomotive tenders, &c. Three firms are devoted to the manufacture of iron, steel and combination bridges, viaducts, roofs and buildings, wrought-iron turn-tables, corrugated iron, &c., with a capital invested of $570,000, employing 750 hands. The value of the product in 1882 was $1,462,000, and in tons, 12,950.

Two furnaces, one in the East and one in the West, have recently been doing some work worthy of note. The furnace of the Durham Iron Works, at Riegelsville, Bucks County, Pa., 75 by 20, turned out 101 gross tons of pig iron in 24 hours, using part anthracite and part coke; and Belfont Furnace, at Ironton, Ohio, 66 by 16, made 435 gross tons of No. 1 mill iron in seven days, or an average of over 62 tons daily.

It is announced in the *Oesterreichische Zeitschrift fuer Berg-und Huettenwesen* that a blast furnace is to be built between Visoko and Vares, in Bosnia, for smelting the manganiferous ore found at the latter place. A syndicate of Trieste merchants has also been formed for developing the mineral wealth of the country.

San Francisco is not afraid that the completion of the Northern Pacific Railroad will divert the trade of that port. The *Bulletin* says: "San Francisco will remain forever the unquestioned mistress of 1000 miles of sea coast on the Pacific, and the port or entrepôt of the great Northwest as distinguished from the Northeast."

A New Southern Blast Furnace.

According to the Birmingham (Ala.) *Daily Age*, the new Alice Furnace No. 2 was blown in on July 24. The building of the new furnace was commenced in May, 1882. The foundations were soon laid and everything made ready for the superstructure, but here a delay occurred in the delivery on the ground of building materials, caused by labor strikes throughout the North, including the establishments with which the Alice Furnace Co. had contracts for iron of various kinds necessary for the new furnace. On account of this delay work was not resumed until October.

Alice No. 2 is the largest furnace in the State, and there is only one larger in the South, the Victoria Furnace, in Virginia. The stack of Alice No. 2 is 75 feet high, with a bosh of 18 feet. It has eight tuyeres and eight iron columns 21 feet high; Witherow & Gordon's latest improved patent adjustable tuyere stock; 4 cooling plates in the bosh above the tuyeres, with a water-breast below. The bell is lifted and lowered by a special steam engine with a water-brake attachment. The hoisting engine is Crane Bros.' latest patent; the cast-iron columns used in this elevator, which is 101 feet high, were made in Birmingham by C. P. Williamson. The three stoves, each 19 feet in diameter and 76 feet high, are the new Whitwell hot blast in all its completeness, with gas and air valves and facilities for cleaning. The lining of the stoves is built of Ohio brick. A massive row of 20 boilers for both furnaces, and quite new, is a feature of no mean interest. They are each 46 inches in diameter and 34 feet long, with two 16-inch flues. The draft stack rises 163 feet high, with a diameter of 9 feet, and is the highest object in Birmingham. A blowing cylinder, 84 inches in diameter, with a 54-inch stroke, and a steam cylinder, 36 inches diameter, 54-inch stroke, are of the most important improvements in the new furnace. The two engines, it is claimed, make more blast on less steam than any other in the South. The engines weigh 80 tons each, the weight of the wheels being 16 tons, 16 feet diameter. All the machinery is made easily accessible by platforms and stairways, and was turned out by the Cuyahoga Steam Furnace Co. of Cleveland, Ohio.

Just in the rear of the furnace plants are 251 coke ovens, all making coke with the exception of a few which will be fired this week. Exceptionally ample storage is provided, 22,000 tons of ore and lime rock being now on hand, with room for 5000 more. The storage-room for coal is one of the largest in this region, and has a capacity of 5500 tons. A large number of shutes make a convenience for emptying the coal into larries, which are run upon a hydraulic hoist, the simplest, cheapest and most durable mode of elevating heavy material in large quantities. The stock-house is in keeping with the other big proportions of the plant. It is provided with two sets of Fairbanks' charging scales.

It is the expectation of the Alice Furnace Co. to make 90 tons of iron daily with the new furnace. The average of the old one is about 50 tons. Either furnace may at times go much beyond these figures, but it is deemed the most satisfactory products are to be obtained without straining, and by regular and easy habits. President Hillman, of the company, says, "A furnace is like a man; in order to digest well, he must not be over-fed." The Alice iron, which has peculiar to itself a considerable reputation in the markets, is made of a mixture of brown and red ores. The brown contains 45 per cent. of metallic iron, while the red has 50 per cent. of metallic iron. These ores are obtained from the company's mines, one of the brown ore at Green Pond, on the Alabama Great Southern Railroad, 27 miles below Birmingham, the other of red ore at Hillman Station, 8 miles from Birmingham, on the same road. It is estimated that the brown-ore property has convenient for use 6,000,000 tons, and about 38,000,000 tons of red ore are contained in Red Mountain, belonging to the company. Limestone, with 92 per cent. carbonate of lime, is obtained from the Blount Springs quarries. Adjoining the property of the Pratt Coal and Coke Co. are the Alice coal lands, of which there are 4500 acres, the coal being of the same vein as the Pratt mines. These lands are not in use, however, being held in reserve. All the coal consumed at the two furnaces is obtained from the Pratt mines. The pay roll, considering those who work full time, contains an average of 600 men. The capital stock of the company is $300,000.

The officers of the company who directly participate in the management of the two furnaces are T. T. Hillman, president, and Mr. Frank L. Wadsworth, secretary and treasurer. The principal markets for the Alice iron are Nashville, Louisville, Indianapolis, Chicago, Springfield, Cincinnati, Evansville and St. Louis, besides an important patronage west of St. Louis, and, of course, in the Southern and Southwestern markets.

High Speeds on Railways.

High speeds on railway forms the subject of some very interesting remarks in a recent number of *Science*. Among other things we find it stated that, as regards cheapness, general excellence of bridges, locomotives and cars, the railways of this country are ahead of the rest of the world. The signal arrangements here, however, with few exceptions, are rudimentary and inefficient, and render fast traveling a matter of considerable difficulty, if not danger. It is impossible to run a really fast express train if the signals are ambiguous, and if every level crossing is made a compulsory stopping-place. The saving in time by fast trains can only be fully felt in a great country, where very long journeys are not only possible, but are frequently undertaken; but hitherto this fact has been little appreciated, and people have been content to travel at a slow speed, and put up with frequent stoppages, because the railways were new, the rails roughly laid and many bridges unsafe at a high speed. But of late years these conditions have been materially changed. The widespread use of steel rails, the greater care bestowed on the road-bed and the introduction of iron bridges of first-class workmanship, have rendered high speed perfectly safe and easy on most parts of good roads in the Eastern and Middle States; but it is rendered unsafe where switches are so arranged that they may be left open to an approaching train without any signal warning the engineer, or the signals are so formed that the difference to the eye between a clear or all-right signal and a danger or stop signal is slight in snowy weather, or under certain atmospheric conditions which render the difference between colors imperceptible, though a difference in form may be perceived.

The real gain of time to a business man, obtained by a difference of a few miles an hour in the speed of a long-journey train, is best illustrated by an actual case: A man in New York wishes to do a day's work in Chicago. He takes one of the fastest and best-appointed trains he can find—the Chicago limited. It leaves New York at 9 a. m., and lands him at Chicago at 11 the next morning, having accomplished 911 miles in 26 hours 55 minutes, allowing for the difference in time between the two cities. This makes an average speed of 38.8 miles per hour, including all stoppages. But assume, what is surely not extravagant, that as high a speed can be attained on the Pennsylvania or any other first-class American road as on an English main line, and what shape does the problem assume? On one English road, the Great Northern, the distance between Leeds and London (186¾ miles) is done in 3 hours 45 minutes, including five stoppages; on another, the Great Western, the 129¼ miles between Birmingham and London are run in 2 hours 45 minutes, including two stoppages, and, as neither of these routes is particularly level or straight, and both pass through numerous junctions with a perfect maze of switches and frogs, they give a fair idea of what is possible in speed on the railroads of this country. These figures give, respectively, speeds of 49.8 and 47.2 miles per hour. Taking as a fair average 48 miles an hour, including stoppages, the journey from New York to Chicago should be done in 18 hours 59 minutes, or, say, 19 hours—a saving of 7 hours 55 minutes on the present time, so that if the train were arranged to leave at 55 minutes past 4 in the afternoon, instead of 9 o'clock in the forenoon, the whole of this time would be saved in the busy part of the day, effectually adding a day to our imaginary traveler's business and dollar-making life.

It may be thought that such a deduction is unfair, as the English style of car is so much lighter than the American; but, as a matter of fact, the average English express train is considerably heavier than the Chicago limited and conveys about three times the number of passengers; and, as trucks and oil-lubricated axle-boxes are not yet universal there, the tractive resistance per ton is probably higher. It certainly, therefore, seems not only possible, but feasible, to attain these high speeds in this country, where, owing to the long distances to be traveled, they are more valuable than in England, and the great step toward attaining that end is the adoption of proper and efficient signaling arrangements. All the other steps are achieved; the American passenger locomotive of the present day is perfectly competent to a drag a heavy train at a rate of over 60 miles an hour; the cars, as now constructed, can travel safely and smoothly at that speed, and the steel rail and the well-ballasted tie and perfect workmanship of the modern iron bridge can well support the thundering concussion of an express train at full speed. But this speed can only be maintained for a few miles at a time if the engineer who guides this train be donbtful whether the dimly-seen signals imply safety or danger, or if the laws of the State bring him to a full stand where his road is crossed by a small corporation with a high-sounding title, which owns one locomotive with a split tube sheet and two cars down a ditch.

To run a fast train, a clear, uninterrupted road is absolutely necessary, and the reason is not far to seek. To move a body from a state of rest to a velocity of 60 miles per hour, or 80 feet per second, an amount of work must be performed equivalent to lifting that body 121 feet. Now, it is apparent to the simplest capacity that it requires a pretty powerful engine to overcome the resistance of a train running at 60 miles per hour, without every few miles putting on brakes to destroy this velocity, and then to lift it 121 feet again to attain speed, the resistance of the air, and the friction of bearings on journals and of flanges against rails going on all the time. As a matter of fact, showing what severe work this is on an engine, the Zulu express on the Great Western Railway, of England, which is the fastest train in the world, has been repeatedly carefully timed, and it is found that, though running over an almost absolutely level and straight road, it takes a distance of 26 to 28 miles to attain its full speed, about 58½ miles an hour. In this connection some particulars given in the address of President Westmacott, of the British Institution of Mechanical Engineers, at its recent meeting, may prove interesting. Mr. Westmacott, in dwelling upon the gradual increase of speed on railroads, stated that in 1825 George Stephenson was ridiculed for maintaining that trains would be drawn by locomotives at 12 miles an hour, but the Rocket herself attained a speed of 29 miles an hour but a few years later, and long afterward ran 4 miles in 4½ minues. In the year 1834 the average speed of trains was, on the Liverpool and Manchester Railway, 20 miles an hour. In 1838 it was 25 miles an hour. In 1840 there were engines on the Great Western Railway capable of running 50 miles an hour with a train and 80 miles an hour without. In 1841 we find Stephenson ranged on the side of caution, and suggesting that 40 miles an hour should be the highest regular speed of trains. It is a remarkable fact that the highest speed at which locomotives run in ordinary practice scarcely seems to have been raised during the last 25 years, while, on the other hand, the weight of the trains has been perhaps doubled. Although the average running time of express trains has in many cases improved, this has been almost entirely due to their making fewer stoppages. At the same time the speed occasionally attained is very great, and engines on some of the principal English lines are said to have repeatedly run 15 miles in 12 minutes, or at the rate of 75 miles per hour. Express trains run regularly at 53 miles an hour.

The Iron Age

AND

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INDEX TO VOL. XXXI.

The index for the half-yearly volume of *The Iron Age*—January to July, 1883—is now ready. A copy will be sent to each subscriber who sends a request for the same. Those who desire the index should apply at once.

The Introduction of Steel Rails.

It is difficult to realize that it is barely 20 years since the first steel rail was laid in the track of an American railroad. Steel rails are now so universally used, and they are manufactured in such enormous quantities—far beyond anything accomplished in the reign of iron rails—that it seems strange that there was any difficulty in inducing railroad managers to use steel in place of iron. Yet it appears that there was very great prejudice against the use of steel for rails when the matter was first considered, and even if the supply had been unlimited, it would have taken years to convince railroad managers generally that steel rails could be relied on for the most arduous service. The first steel rails used in the United States were imported from England in 1862, by the firm of Philip S. Justice & Co., of Philadelphia and London, and from Mr. J. Howard Mitchell, of that firm, we have received some authentic and interesting information in connection therewith. Steel rails were then used to a limited extent in England, and so enthusiastic in their praises of these rails were the managers of the lines on which they were used that the firm in question endeavored to have an American railroad make some experiments with steel. But the Philadelphia firm were looked on as fanatics, if not swindlers, when they talked about steel rails to American railroad managers, and it was seldom that they could obtain the earnest attention of the proper officers. The rule was, Mr. Mitchell says, "to bow us out of the office, and end "the annoyance of being talked to by a "'dreamer.'"

In 1862, however, after many efforts in this and other directions, Mr. John Edgar Thomson, then president of the Pennsylvania Railroad Co., was induced to give steel rails a trial, and he ordered 100 tons at $150 per ton in gold—equivalent, at that time, to something over $300 per ton in currency. But, unfortunately, the trial lot of rails was made of crucible steel, which proved to be very high in carbon, being made so to resist wear. They were put in the tracks of the company in yards and at other points where the greatest wear took place, and during the following winter, which was a very severe one, many of them broke. Such a result might have been a crushing blow to the use of steel rails if it had happened under the management of a less sagacious man than Mr. Thomson. He saw, however, that if he could get rails that would not break, yet would endure the great traffic of his railroad with as little wear as this lot had shown, it would be extremely desirable, and he therefore gave further orders for 500 and 1000 ton lots, which were then looked on as wonderfully large orders.

In 1864 Messrs. Philip S. Justice & Co. sold to the old Beaver Meadow Railroad Co., now part of the Lehigh Valley Railroad Co., 100 tons of steel rails for $162.50 per ton in gold, or about $250 per ton in currency, and other lots at $135 per ton, gold. These rails are supposed to be still in the tracks, as a year ago Mr. Lloyd Chamberlain, then treasurer of the Lehigh Valley Railroad Co., but lately deceased, told Mr. Mitchell that they were excellent rails and were still in use. Very slowly did the use of steel rails grow from these humble beginnings. Yet there were those, railroad managers and manufacturers, who foresaw the inevitable overthrow of the iron rail by its steel rival, and who encouraged and engaged in the manufacture of steel rails in America. On May 24, 1865, the first steel rail was rolled in this country, by the North Chicago Rolling Mill, and of Bessemer steel. Since that time steel rails have been used in increasingly large quantities, as all our readers very well know, and orders for from 30,000 to 60,000 tons have been placed at one time by the leading railroad companies.

The circular printed on another page was issued on February 1, 1868, by Mr. Philip S. Justice, and is worthy of reproduction, inasmuch as it plainly shows how railroad managers had to be educated at that late day concerning the relative value of iron and steel rails, although the author perhaps claimed a few years too many for the life of the steel rails he was comparing. The first cost of steel rails ($150) and of iron rails ($80), given in the circular, seems almost improbable now, but those prices were then ruling.

Our Trade with Chili Before and Since the War.

The Statistical Bureau at Santiago has just published its annual "Estadistica Comercial," showing that, notwithstanding the late war, Chili's trade with foreign countries again shows a notable increase, amounting to nearly $9,900,000 in imports and $8,900,000 in exports. The particulars at hand show that American trade has been fairly represented in this improvement. During the ten fiscal years preceding the war on the Pacific—from 1869–1878, inclusive—we exported to that country domestic merchandise valued at $20,291,355, or an average annual amount representing $2,029,136. During the war the exports fell—in 1879 to $1,253,555, in 1880 to $967,551, and then again increased to $1,598,270 in 1881, and to $1,756,645 in 1882. Our heaviest export to Chili is in cotton goods, hardware and crushed sugar.

According to the official statistics the subjoined figures for imports, exports, &c., represented the fluctuations in Chili's foreign trade during 1880 and 1881:

	Import.	Export.	Tot. trade.
1880...........	$29,716,004	$51,648,549	$81,364,553
1881...........	39,564,814	60,525,859	100,090,073
Increase......	9,848,810	8,877,310	18,726,120

So far as the trade of Chili with foreign countries during the last 38 years is concerned, the following table appended to the Government report may prove interesting. It embraces the period from 1844 to 1882, the figures given representing millions of dollars:

	Import.	Export.	Total trade.
France....................	$153	$66	$219
England..................	326	536	862
Germany..................	82	26	108
Belgium..................	18	2	20
Spain.....................	12	1	13
United States............	66	68	134
Peru......................	54	120	174
Bolivia...................	13	33	46
Argentine Republic......	42	14	56
Brazil....................	23	8	31
Other countries.........	35	51	88
Total..................	$824	$927	$1751

It will be seen that in the total trade the United States rank after England, France and Peru, with a total of $134,000,000, our annual export during the period having averaged $1,800,000.

In 1881 British exports to Chili amounted to $17,589,267; those from Germany represented $7,385,870, while the French exports were valued at $5,588,919. Ecuador sent merchandise equal to about $2,005,049, while the Argentine Republic and this country were represented by $2,032,517 and $1,748,818 respectively. The articles of import were distributed as follows: Food, $8,084,758; dry goods, $11,056,321; clothing, $2,837,884; hardware, $3,789,604; house-furnishing goods, $2,388,759; locomotives, $811,700; wines and liquors, $1,119,743, and tobacco (manufactured), $139,752. Among exports, nitrate of soda, guano, iodine, copper and silver and their ores constituted a total of $47,145,757, while wheat, flour, barley and beans aggregated $9,967,780. Owing to the acquisition by Chili of the Province of Tarapaca, the exports of nitrate and iodine will, in the future, show a notable increase, both being rising industries in this district. The year 1869 witnessed the largest exports of copper, the total amount being 54,867 tons. In 1881 this quantity had decreased to 37,500 tons, but since then a gradual improvement has taken place. Of wheat Chili shipped 459,900 tons in 1873, 273,300 tons in 1878 and 359,000 tons in 1881.

The foreign obligations of the country now amount to some $34,870,000, and those at home to $56,546,504, making a total debt of $91,416,584. The probable income for the present year will be about $36,462,000, while the expenditures are estimated not to exceed $34,770,000. Considering the resources of the country, and the fact that they may be readily turned to profitable account, it will be conceded that the existing debt is by no means large. Chili, in fact, issues from the war with an unimpaired credit, having at all times promptly met her obligations and paid off her bonds as they came due, and at the present time everything points to a promising future.

Trade Tribunals in Pennsylvania.

The formation of tribunals under the new law in Pennsylvania for arbitration and conciliation in labor questions will be watched with much interest, particularly as Pennsylvania districts have been so productive of angry contests between capital and labor. According to this law, the tribunals are to be made up of an equal number of representatives from both sides, with an umpire mutually chosen, and the decision of the latter may be enforced by law, if suitable provision be made. This last-mentioned circumstance has provoked criticisms from different sources, all united in condemning the compulsory feature. However, we can scarcely find a sufficient basis for any reasonable objection to this, and think that foreign labor movements have conclusively demonstrated the beneficial effects of similar systems. In addition, we would remark that the decisions of the umpire can be enforced only in matters other than those pertaining to rates of wages, and the functions of the tribunal in connection with the latter subject are of an advisory nature only. Suggestions may be offered which in very many cases may lead to an amicable settlement of what might otherwise grow to be an embarrassing difficulty. It has been shown beyond a doubt that the system is a commendable one, and, notwithstanding the uncertainty and looseness manifested in its adoption in Great Britain, its achievements in that country deserve consideration.

The French Government institutions known as the "Conseils des Prudhommes," though differing in many features from the proposed Pennsylvania tribunals, have also amply proved their efficiency in numberless cases. This will be more readily understood when we state that, though French workmen and employers appear to grow more stubbornly litigious with every new year, yet it is noted that of the cases brought before the courts of consideration, something like three-fifths are generally settled amicably. This undoubtedly is a remarkably good record, and there seems to be no reason why similar institutions should not yield similar results in this country. At any rate, the experiment is well worth trying, and the first case to be disposed of under the new regulation will probably show how well adapted it is to smooth down the ruffled spirits and bring about a mutually satisfactory agreement between employee and employer.

We have heard that an effort is being made to organize a company, erect a large building and establish a permanent industrial exposition in the city of New York. The success of the Chicago exposition, and the importance of the Louisville and Cincinnati and Boston exhibitions, have been some of the reasons assigned for such an exhibition. While heartily in favor of the organization of manufacturers which shall undertake a series of international expositions once in three or five years, we are not in favor of any scheme looking toward a permanent exhibition either in New York or elsewhere. As a show, such a thing might be made of interest, but even this is problematical. No permanent exhibition, we believe, can be made of any good whatever to the manufacturer. The very fact that it is permanent deprives it of the features which are essential to the manufacturer's successful exhibit. The only interest that the manufacturer has in the exhibition is to have those who are likely to purchase see his goods. After they have seen them, every day that the exhibition is prolonged is a disadvantage. A permanent exposition defeats its own object in the eyes of the manufacturer by being permanent. It entails, if it is to be of any value to him, a constant outlay for some one to take charge of his exhibit who can explain the best points to visitors. Permanent exhibitions are of very little value, since it will only be at long intervals that customers will make a visit. To be of advantage there must be concentration of time. Large numbers must come within a short period, but with a permanent exhibition it is impossible to accomplish this. Large numbers will doubtless attend, but they will be scattered over long periods of time; expenses will have to be reduced to a minimum and the articles displayed must be of a character to catch the popular eye. The soap makers, those who have canned goods to sell, flower and seed men, grocers, jewelers and clothiers can all afford to take space and have permanent exhibits. To them every one is a customer. To machinery men and the great manufacturers, however, the buying class is comparatively small, and it must be reached by special means.

Our Mexican Relations.

The future of our relations with Mexico must soon be determined, so far as relates to their commercial character. American enterprise has infused into the entire country a new vitality. The introduction of large amounts of capital, the building of new railroads and extension of old ones, are exerting an influence that is felt throughout the length and breadth of the land, by stimulating all branches of industry, elevating the standard as well as the price of labor, creating new wants and inspiring a new ambition among all classes. Thus, while the country at large is becoming conscious of having many necessities such as spring from a more advanced stage of social enlightenment, it is at the same time providing the means for their supply. The semi-civilized masses of Indian and mixed blood who largely preponderate in an aggregate of 10,000,000 souls, have already learned that clothing is preferable to nakedness, and that stout boots or shoes are by no means an incumbrance. They are also inquiring for implements and domestic utensils, as are the upper classes for a wide variety of manufactured goods; also machinery, general hardware, wire fencing, cooking stoves, fine cutlery, mills for cotton, sugar and woolen factories, and tools of every description used either in mechanical or agricultural pursuits. The process of development, though it may be slow, is none the less real and substantial. England so far realizes the fact that she makes overtures for a renewal of diplomatic relations, and is supposed even to indulge in dreams about resuscitating an enormous indebtedness of $135,000,000 incurred by Mexico under former administrations. The United States are not likely to be forestalled by movements in any other quarter looking to the establishment of reciprocal trade relations on a basis of greater intimacy. The subject will doubtless be again seriously presented before Congress at the coming session, and can hardly fail to elicit action suited to the exigency of the situation. The general drift of events, as affecting the relations of the two Republics, is this week indicated by a circumstance of special significance. Postmaster-General Gresham, in a communication to the Director-General of Posts in Mexico, refers to the lessened frequency of mail communication between the United States and Mexico via Vera Cruz since the outbreak of yellow fever, and suggests "the desirability "of using railway facilities for transmitting "mails as early and to as great an extent as "may be possible." Merchants in the Mississippi Valley are also seeking closer connections with Mexico. Only recently the first shipment of coffee from Maracaibo, Venezuela, was received in St. Louis via Mexico, together with 100 tons of lignumvitæ, and the same week a Mexican merchant from Chihuahua ordered machinery to the extent of $10,000. Reciprocity is only a question of time, and time goes with railroad speed.

The city of Birmingham, England, is agitated by a rather remarkable project, which, though at first sight utterly unfeasible, seems to have some promise of success. The proposition is to put down 11,000 horse-power engines, compress air and deliver to manufacturers air under pressure for the driving engines. The net power realized is expected to be about 5000. From 36 to 52 per cent. of the horse-power of the compressing engine is expected to be realized in the motors, and, even with this enormous waste, it is expected that a saving can be made. Investigation has brought the managers to the conclusion that 10-horse-power engines in that city generally take about 16 pounds of slack per indicated horse-power, and many use from 28 to 30. Basing their estimates on this consumption of fuel and its cost, they find that they can deliver compressed air to work steam engines for less than the steam costs the producer, and still have a percentage of profit. If their own horse-power cost nothing save the interest on the plant, we imagine this scheme might be profitable. In fact, at the present time it could be employed anywhere where large water-power is available. The costs and the losses by poor machinery are so great that we think it safe to say that the investment, if successful, will pay the smallest possible margin of profit. The probabilities are certainly greatly against it.

The predominance of steam in ocean transportation, and the insignificant share of the ocean carrying trade which falls to American vessels, appears from the statistics of grain tonnage at this port during the last six months. The total grain shipments, both by sail and steam companies, with the corresponding months last year are as follows:

	1882.	1883
Sail.......................	1,566,841	2,69[illegible],383
Steam.....................	14,441,673	21,922,390

It here appears that the grain trade this year far exceeds that of the corresponding period last year, and that the amount carried by steam is far in excess of the shipments by sail. The single fact that most challenges attention is that, with the exception of 42,000 bushels taken out by American sailing vessels last February, not a single bushel was carried under the American flag. English steamers surpassed all others, taking nearly two-thirds, both this year and last. Belgium comes next. Steam is carrying a larger production year by year, leaving the United States mercantile marine further and further in the background.

The Rolling of Molten Metal.

One of the mechanical papers of this city, evidently more at home in matters pertaining to the lathe, planer and other appliances of the machine shop than in the department of metallurgy, remarks: "*Iron* notes a pro"posed rolling mill for rolling iron and "steel, to be delivered to the rolls in a mol"ten state, by which it is claimed it will "be freed from gases. The rolls are to be "hollow, and a current of water passed "through them to chill the surface of the "metal. We should like to be told how "molten iron can be rolled."

Judging from this, and from the fact that the item which provoked our mechanical contemporary's criticism was extensively reproduced in different papers and considered as something entirely new, it would seem to have been lost sight of that a similar attempt was made some time ago by Sir Henry Bessemer. In the arrangement as brought out at that time, sheet metal was to be made directly from the converter by pouring the molten metal between two revolving rolls. So long as the supply of steel was properly maintained and the rolls worked freely without meeting any obstruction, a continuous sheet of metal of good quality was obtained, and the product, when worked up, was said to give very satisfactory results. However, it is by no means difficult to point out elements of weakness in the method, and to these it is probably due that the rolling of liquid metal never seemed to meet with much favor. Prominent among them is the item of a continuous supply, as it is clearly apparent that anything producing a check in the flow of metal would lead to a more or less complete dismantling of the whole train. The destructive action of the highly-heated metal upon the rolls, tending to produce rough surfaces, is another point of considerable importance, especially in turning out sheet metal, where irregularities, however slight, are necessarily fatal to good results. Another disadvantage is found in the difficulty of keeping the liquid metal free from such impurities as slag, &c., from the ladle, which, when worked into the sheet, would necessitate the cutting away of large portions, thus entailing considerable waste. Even in view of all these difficulties, however, the operation of rolling molten iron or steel is not impossible of execution, and it is to be hoped that our contemporary's remarks, which, we think, can scarcely be misinterpreted, will not be too firmly impressed upon its readers.

Accounts received from Brazil respecting the commercial and financial condition of that country are anything but flattering. Notwithstanding the deservedly high esteem with which the Emperor Dom Pedro has been regarded, it is said that of late years there is a growing dissatisfaction among his subjects on account of the extravagant scale of national taxation and the increasing burden of public indebtedness. Moreover, the industries of the country are said to be actually declining. The aggregate deficits in the Government budget in the last fifty years, so it is declared, amount to about $350,000,000, and the interest charges on the funded debt absorb nearly two-fifths of the total revenue. Yet all fiscal obligations are so promptly met that Brazilian credit stands high in London. Environed by difficulties so formidable, it is not surprising that the foreign trade of Brazil is controlled to such an extent by Europeans, or that American steamship lines to Rio and intermediate ports have only a precarious existence.

Now that it has been decided to have a six penny telegram rate in England, an enormous increase of business in that department is anticipated. The probability of this is strengthened by the fact that a number of prominent London firms have announced their intention of sending out thousands of telegrams by way of advertisement, as soon as the new rate comes into operation. As it is, with telegrams costing double the proposed rate, the telegraph is extensively used for advertising purposes, and the coming reduction in price is most assuredly a strong inducement to extend the practice.

It is said that the successful use by the British troops, during the Egyptian war, of some hastily-armed railway trucks, drawn by an iron-clad engine, has induced the Spanish Government to order the immediate construction of a specially-designed train, which in time of war would be available, not only as a means of rapid transport for men engaged in cutting and repairing of railway lines, but also as a depot for engineering stores and as a movable fortress. The train will consist of 26 trucks, upon which will be placed bullet-proof carpenter's shops and forges, magazines for food, implements, ammunition and explosives, some iron boats and pontoons, and a powerful crane.

Some persons, stimulated by the recent fires in this city, have commenced to argue that buildings have already reached a greater hight than is safe, and would have laws passed to prevent a building from being erected of more than five or six stories, or more than 70 feet from the ground level. This is exceedingly foolish. Lofty buildings are a necessity, at least in cities where land is as valuable as it is in New York. The philosophical way of considering the problem is to find out how lofty buildings can be made safe in case of fire. We might even go fur-

ther, and require that every building exceeding a certain hight be made fire-proof, but, unfortunately, a fire-proof building may contain combustible materials. In such a case it might happen that a whole floor would be involved in a conflagration. Then, of course, a fire-escape would be just as necessary as though the whole building were in a blaze. We see no reason why the architect should overlook the fire-escape. It really should form an integral part of the building, and might, with proper attention from the architect, form a very marked and even ornamental feature of the design. As fire-escapes are usually erected, they have very much the same effect upon the eye as cobwebs upon a room. They seem out of place. They are suggestive of undesirable contingencies, and last, but perhaps not least, they are altogether too weak and too flimsy for the work which they have to do.

An Old Pacific Steamship.

While strolling along the city front, says a writer in "The Resources of British Columbia," and gazing upon the many objects of interest that cluster in and about the beautiful harbor of Victoria, our attention was directed to a stanch old craft whose quaint style of architecture and weather-worn prow proclaimed "a life on the ocean wave" at once long and eventful. Desiring to learn more of the venerable steamer, her very name a synonym of industry, we determined to search for facts, and to the courtesy of one of our most prominent citizens and business men we are indebted for the leading features of this article.

Nearly half a century ago, when the great problem of steam marine navigation was yet only in the experimental stages of solution, a vast concourse of people gathered on the banks of the Thames to witness the launch of a brave little steamship that was destined soon to traverse the waters of two oceans, one of which was known to many only as being somewhere in the region of the sunset, on the far west shores of the Western world. She was built for the Hudson Bay Co. in 1835, and was destined to ply between their several fur-trading stations on the Pacific coast. The two engines of 75 horse power and the boilers were constructed by the firm of Bolton & Watt, the latter being a son of the renowned inventor, and the excellent condition of her engines to-day bears convincing testimony to the great mechanical skill of the builders. As it was not considered safe to use steam on the passage out, she was rigged as a brig, and furnished with six 9-pound guns. Thus equipped, accompanied by a bark in case of accident, and commanded by Captain Home, she sailed down the Thames, greeted by encouraging cheers from the thousands who watched her progress from either shore, and which were heartily acknowledged by booming salvos from the brazen throats of her own guns. Crossing the Atlantic and being the first steamer that ever doubled Cape Horn, she sailed up the broad Pacific, and leaving her companion far behind, arrived at the Columbia 22 days ahead. Calling at Astoria, then the chief town on the Pacific coast, she got up steam and sailed for Nesqually, the principal station of the Hudson Bay Co. on the Pacific, and for years was employed in collecting furs and carrying goods to and from the company's various trading posts on this coast. She next passed into the hands of the imperial hydrographers, and a few years since was purchased by the British Columbia Towing and Transportation Co., of Victoria, and, having been refitted for that service, is to this day regarded as a most seaworthy and powerful tug steamer. In conjunction with another tugboat, this historic vessel had the ill-fated Thrasher in tow at the time of the accident which gave rise to the very protracted litigation known in legal circles as "the Thrasher case," the merits of which have been submitted for final adjudication to the Supreme Court of Canada.

The most recent report of the Swiss Department of the Interior states that there are in Switzerland 8642 factories and workshops under legal supervision, 1472 of which are worked by machine-power. Of these, water furnishes the movement to the amount of 81,316 horse-power, steam to the amount of 14,064, and gas to the amount of 117. The number of operatives employed is 134,862, of which 70,394 are males and 64,498 females. There are 10,462 children between 14 and 16 years of age, 15,590 between 16 and 18, and 109,810 over the latter age. The textiles, such as cotton, silk, woolen and linen, occupy 1619 factories, with 85,705 workpeople; 68 establishments carry on tanning, leather dressing, hair weaving, &c., with 3753 hands; there are 6636 hands employed in 143 food-preparing shops; 2749 in 102 chemical works; 4950 in 150 printing shops. There are also 111 wood-working establishments, occupying 2913 hands; 353 for clock and jewelery making, with 24,988 workpeople; and 96 for glass-making, &c., with 3170.

We understand that the largest upright engine ever seen in St. Louis is now being erected by the Anchor Milling Co. The engine is of the Harris-Corliss vertical make, stands 33 feet high, measuring from the base, and weighs 112 tons. Its cylinder is 42 inches in diameter and its stroke 5 feet. The following are the weights of its leading parts: Piston rod, steel, 3 inches in diameter and 8 feet long, 1505 pounds; crank pin, steel, 12 inches in diameter, 1155 pounds; crank, wrought iron, 4730 pounds; crosshead, steel, 975 pounds; pitman, wrought iron, 3940 pounds; front head, 5800 pounds; shaft for pulley, wrought iron, 20¼ inches in diameter, 36,000 pounds. The engine stands upon a foundation 13 feet deep and containing 31 carloads of large sized stone. It will be fed by a battery of six steel boilers, and at a moderate speed will develop 1000 horse-power. The supply pipe is 16 inches and the exhaust pipe 24 inches in diameter. The pulley used in connection with this engine has a diameter of 24 feet 6 inches, a raised face 42 inches wide, and weighs 77,000 pounds.

Frederick Trenk Stanley.

We have already had occasion to refer, though but briefly, to the late F. T. Stanley, a distinguished citizen of New Britain, Conn., and identified with many important industries, who died in that city on Thursday, the 2d inst. We are now able to present an engraved copy of a photograph taken when Mr. Stanley was near his 80th year, but which is regarded by friends as remarkably truthful in all its lineaments.

Frederick Trenk Stanley was born August 12, 1802, and was the son of Gad and Chloe Stanley and grandson of Col. Gad Stanley, of the Revolutionary army. His birth-place was in the north part of Stanley Quarter, New Britain, in the house now occupied by William J. Stewart. His early life was spent on the farm of his father and in the district school. He developed a quick and active mind and adaptability for a successful business life. He was during one season clerk on the steamboat Oliver Ellsworth, running between Hartford and New York. When a boy he went to New Haven as a clerk, remaining there from 1818 to 1823, and going from there to Fayetteville, N. C. Returning from the latter place he engaged in mercantile business, associated with the late Curtiss Wharples. In 1831 he bought out the business of W. B. Stanley, Henry W. Clark and Lora Waters, who occupied the present Giddings building on Main street at the railroad crossing. They had made machinery, but Mr. Stanley changed to the manufacture of locks, the first ever made in this country. This firm bought and put in operation the first stationary steam engine used in the town, and Westell Russell, of Hartford, now County Commissioner, was the engineer.

In 1835, Mr. Stanley, his brother William, Emanuel Russell, Smith Mattison and T. and N. Woodruff, bought 30 acres of land on the west side of Main street, and in 1836 built a dam and brick factory and went more extensively into the manufacture of locks. The water privilege, and, for the most part, the land, is now owned and used by the Russell & Erwin Mfg. Co. In 1841 Mr. Stanley sold out his interest in the business, which ultimately came into the hands of the Russell & Erwin Mfg. Co., and after an absence of two years in Mississippi with his brother, returned and began the manufacture of hinges. They also manufactured door and shutter bolts, latches and trunk handles. When they began the manufacture of bolts in 1844 all door bolts were imported; for many years none have been. In 1852 the business was taken up by the Stanley Works, a joint-stock corporation, of which Mr. Stanley was president from the date of its organization until his death.

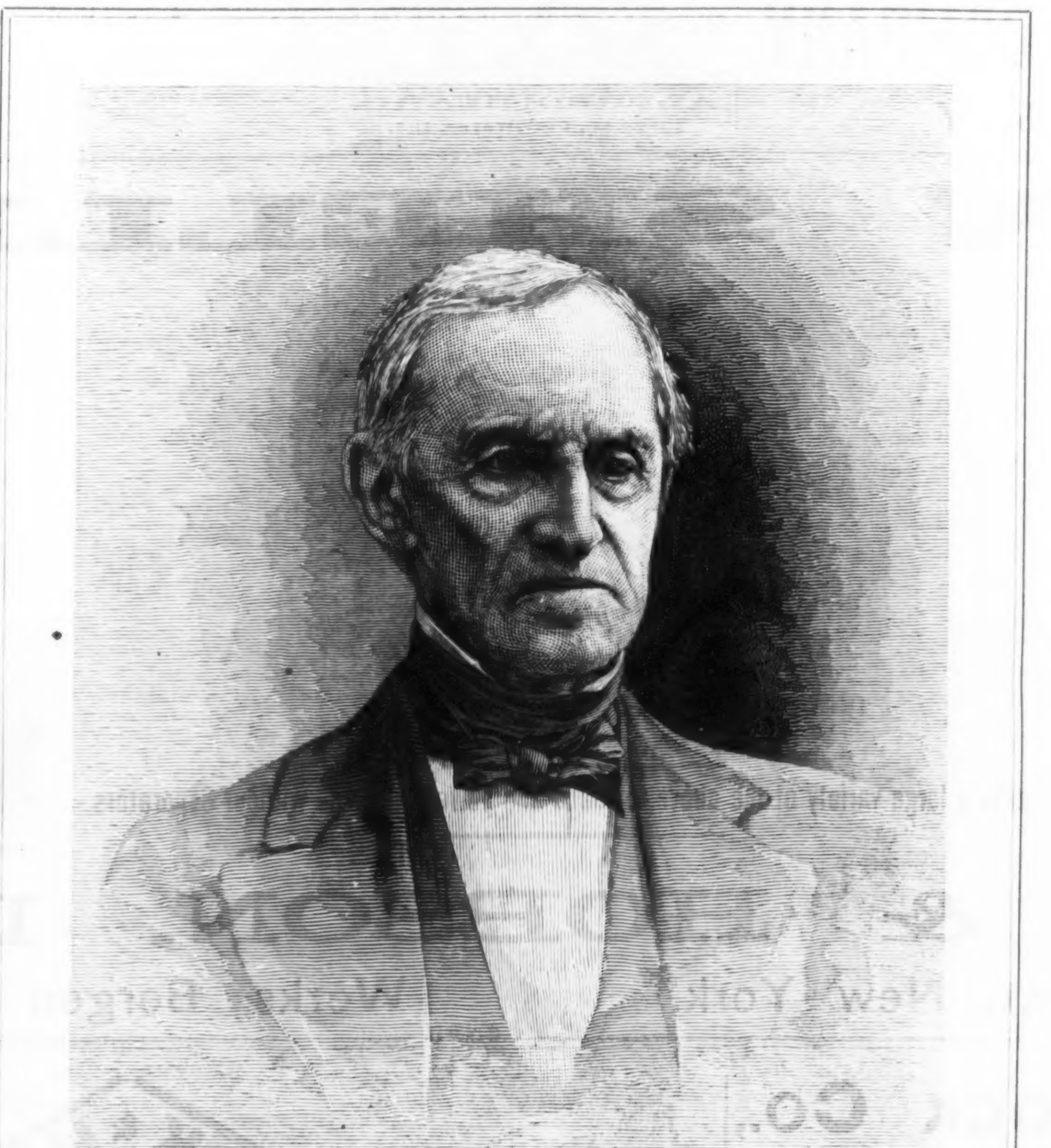
Mr. Stanley's influence, though exerted mainly in furtherance of those objects with which he became early associated, was by no means local. Business organizations which sprang up under his guiding auspices have a world-wide fame. Beginning with little capital and a few workmen, he developed a business which, in one branch alone, now employs 500 operatives, has a plant worth $500,000, and does a yearly business of nearly $1,000,000.

Mr. Stanley was a methodical but progressive man in all business matters. His mind was fertile, his apprehension quick his decisions prompt and his manner energetic. His accumulations would have been much greater except for his generosity in the giving of his means and time for the benefit of others, and especially the advancement of the public interests. The city water works, built in 1857, were the result of his perception of the immediate and prospective wants of the city. The borough of New Britain at that time had a population of less than 5000, and the project of making a reservoir at Shuttle Meadow to supply it with water met with much opposition, and it was carried through chiefly by the enthusiastic energy of Mr. Stanley. He was one of the active workers in the enterprise of locating there the State Normal School. He labored, in season and out of season, to get railroad facilities. There was no public enterprise in that place, from 1830 until feeble health laid him aside, in which Mr. Stanley was not among the foremost of its promoters.

In politics he was a Whig until the breaking up of that party and the formation of the Republican party, with which he has since acted. He was an ardent admirer of Daniel Webster, and grieved much that he failed of a nomination for President at Baltimore. He never failed to hear Webster speak on great occasions if it was possible for him to be present. He heard him at Bunker Hill, at Dartmouth, at New York and in the Senate. Many of the celebrated passages in Webster's speeches he could recite almost *verbatim*, and he was familiar with his whole public life. He often recalled, and with great pleasure, a ride, when he was a clerk, in the stage coach from Berlin to New Haven, with Webster. He had opportunity several times during his mature life to meet and converse with Mr. Webster. Mr. Stanley almost always declined public office, but he consented once, in 1834, to represent the town, which was then Berlin, and he was elected the first Warden of the borough in 1850 and first Mayor of New Britain 1871. Mr. Stanley's recollection of the early history of all the business enterprises of New Britain was remarkable, and it was a rare pleasure to hear him converse on such subjects. He could with perfect ease recite the exact date of almost any public event of half a century prior to 1870.

He married, July 4, 1838, Miss Melvinia A. Chamberlain. They had three children born to them, two of whom died in childhood, the survivor being Mr. A. H. Stanley, of New Britain. Mrs. Stanley died with scarlet fever August 16, 1843. Mr. Stanley's only sister, Catherine, the wife of Henry Stanley, died about a year ago. Mr. William B. Stanley is the only survivor of the brothers and sisters of Frederick T. Stanley. Since 1877 Mr. Stanley has been almost entirely deprived of sight, which to him was a great affliction, as he was extremely fond of reading and writing He bore his sorrow, however, with great fortitude. He has been gradually declining in health for several years, and for the last year has seldom been out of doors. But during all the years of his ill-health he has been cheerful; he frequently entertained and instructed his friends with reminiscences. He has, until within a short time, kept well informed on current events, and discussed them with real interest and intelligence. The late action of the city with reference to a better supply of water was of great interest to him, and met his approval because of his knowledge of the contemplated source of supply.

Mr. Stanley was intelligent, of varied information, of unflinching integrity, conscientious, loyal to his country, and unwearied in his efforts to advance the prosperity of his native town, in which he took a remarkable pride. New Britain, by reason of his life, is richer by far in all its substantial interests, business, social, educational and religious. His was a long and well-spent life, and although ended, his memory will be cherished with gratitude by all who knew him.



FREDERICK TRENK STANLEY.

LATEST LEGAL DECISIONS.

FALSE PRETENSES—SUFFICIENT FACTS.

J, a merchant, was indicted for obtaining goods by false pretenses from F. P. & Co., wholesale dealers, and the false representation was this: He stated that he wanted to buy goods on credit, in the fair and usual honest course of trade, with the intent to pay honestly for them, and F. P. & Co., it was declared in the indictment, on the faith of this pretense, delivered the goods to J. A conviction was had, and it was objected on the appeal of case—State *vs.* Jordon—in the Supreme Court of Louisiana, that these facts were not sufficient to justify a conviction. But the court affirmed the judgment, and through Judge Fenner said: "We think the facts are sufficient to show a bargain of sale, so that the delivery of the goods is connected with it. There is quite enough here to support an indictment for obtaining goods by false pretenses and a conviction thereon."

MINING—DEED—SURFACE SUPPORT.

Purchasers of the surface of land from the same grants who had sold and conveyed the minerals thereunder brought an action to eject the mine owner from the occupation of any portion of the surface for sinking shafts, making any excavations or constructing any machinery, because, by the deed for the minerals, no reservation for surface rights was made. In this case—Ericson *vs.* Michigan Land and Iron Co.—the plaintiff succeeded in the trial court, but the judgment was reversed by the Supreme Court of Michigan. Judge Campbell, in the opinion, said: "It seems to be the general—and, we think, the better—doctrine that a mere reservation of minerals, or such a reservation with the right of mining, must always respect surface rights of support, and will not, standing alone, permit the surface to be destroyed without some additional statutory or contract authority, and that such statute or contract authority will be carefully construed to prevent the destruction of surface rights But it seems to be also agreed that the easements to do such acts as are reasonably necessary to get out the mineral and remove it from the mine may be granted or reserved so as to attach to the mining estate. We think that ejectment will not lie for those parts of the land necessarily occupied by shafts or other mining excavations, or erections made and used solely for mining purposes, and that their use is in the nature of an easement which is appurtenant to the mine. The plaintiff is entitled to compensation under the deed for the appropriation of the surface, but he cannot eject the company from the land which it is occupying for the necessary purposes of mining."

TELEGRAPH COMPANY—CLAIM FOR DAMAGES—TIME TO BRING ACTION.

An action was brought to recover damages against a telegraph company for negligence in transmitting the dispatch, so that it was not promptly delivered. The mistake was in the transmission of the name, "Heiren" being sent "Hermen." On the telegraphic blank used by the sender it was stated, as the contract between the parties, "that no claim for damages shall be valid unless presented in writing within 20 days from sending the message." No claim for damages was made until 24 days after the sending of the message. The trial court decided in favor of the company, and the plaintiff carried the case—Heiren *vs.* Western Union Telegraph Company—to the Supreme Court of Wisconsin, where the judgment was affirmed. Judge Orton, in the opinion, said: "This condition as to making a demand for damages in a stipulated time is valid. Such a condition has been held obligatory in insurance, freight and other contracts, and in legislation where damages have resulted from accident or negligence, and in such cases the principle is now undisputed. But it is clearly not unreasonable that a telegraph company should require notice of claims for its defaults within a reasonable time before being held to answer for the alleged default. From the nature of its business this may be essential to its protection against unfounded claims. Another reason is found in the multitude of messages transmitted, requiring a speedy knowledge of claims, to enable the company to keep an account of its transactions before, by reason of their great number, they cease to be within recollection or control. It may be added that this was a night message, and at one-half rates, because of its not requiring repetition, and, on account of its liability to mistake, error or delay, and of the common uncertainty and greater labor of night work, the company should not be held unless there is the clearest liability."

NEGOTIABLE INSTRUMENTS—TRANSFER AFTER MATURITY—DEFENSES.

G made his promissory note to S, who indorsed it and then sold it to a bank; it was not paid, and the bank transferred it for a valuable consideration to M. As between G and S there was an agreement that each should pay half of the note, but neither the bank nor M had any notice of it. In an action for the note against G alone, he set up the defense that he was liable for one-half of its amount only, but the trial court gave judgment against him for the full amount. In this case—Bank of Sonoma *vs.* Gove—the Supreme Court of California, on the appeal of the defendant, affirmed the judgment. Judge McKinstry, in the opinion, said: "If a party who transfers a note or other negotiable instrument after it has matured, and who had purchased it before maturity without any knowledge of any defense to it, his transferee acquires as good a title as he himself had, although it was overdue and dishonored at the time of the transfer. Here the note was discounted by the bank before it became due, without notice of the agreement between the original parties, and its transfer carried with it a valid title to the instrument."

PROMISSORY NOTE—MATERIAL ALTERATION—PLACE OF PAYMENT.

A note was made payable 12 months after date, or before if certain goods were sold. No place of payment was stated in the note, but it was agreed, verbally, that it should be collected at the residence of the maker. The payee, however, inserted in it that it was payable at "First National Bank, Sioux City, Iowa." It was then sold before maturity, and without any notice of the agreement as to the place of payment to C. The maker refused to pay the note, and in the action brought upon it—Charlton *vs.* Reed—set up the defense that the insertion of the place of payment was a material alteration and invalidated the instrument. The plaintiff, in reply to this defense, claimed that as the time of payment was indefinite, the note was not negotiable, and that it was not a material alteration of a non-negotiable note to insert a place of payment. The defendant had a judgment, and the plaintiff appealed to the Supreme Court of Iowa, where the judgment was affirmed. The Chief Justice (Day), in the opinion, said: "It is insisted that the note was not negotiable because it is not certain as to the time of payment. This position is not sustained by the weight of authority. It has been decided in Pennsylvania, Vermont, Massachusetts and Kansas that a note payable at a certain time, or earlier in the event of a sale or other contingency, is negotiable. The cases relied upon by the defendant all show that the notes there in question were not payable at all except in the event of some contingency. The alteration in the note here was a material alteration; and a material alteration may be shown to invalidate a note, even as against the indorsee thereof, for value before maturity."

The Philadelphia *Record* says: "The brigantine Julia Blake, which was recently detained for nearly two weeks at the Quarantine Station on account of having a case of yellow fever on board, has discharged at Dickinson street wharf a number of curious old bells which have been cracked in the service of the Catholic Church on the Island of Cuba. Every year about this season these old and useless bells, many of them cast hundreds of years ago in Italy and Spain, are collected in Cuba by a gentleman doing business with Philadelphia, and shipped here to be disposed of at the market rates for old bronze. Many of the bells are fine specimens of the best workmanship of Europe's oldest and most celebrated foundries. There for years their music has rung out upon the tropical air from the steeples of the churches of Havana and the smaller chapels scattered here and there throughout the country, until at last they have broken down in the service and have been turned into junk."

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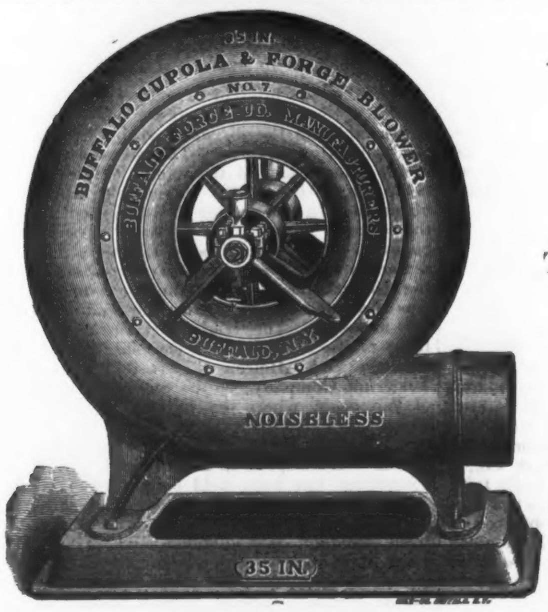
BUFFALO CUPOLA & FORGE BLOWERS



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For illustration see last *Iron Age.* Circulars and discounts to the trade on application.

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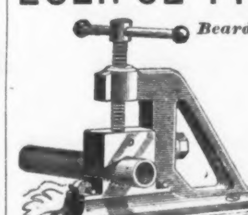
Beard's Pat., Feb. 1883.



Made from Malleable Iron, with Sliding Steel Jaw, open or closed frame. Guaranteed to be the cheapest and best Pipe Vise in the market. Small size, $7.00.

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Hot Hammered and Pointed

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WILL NOT SPLIT,

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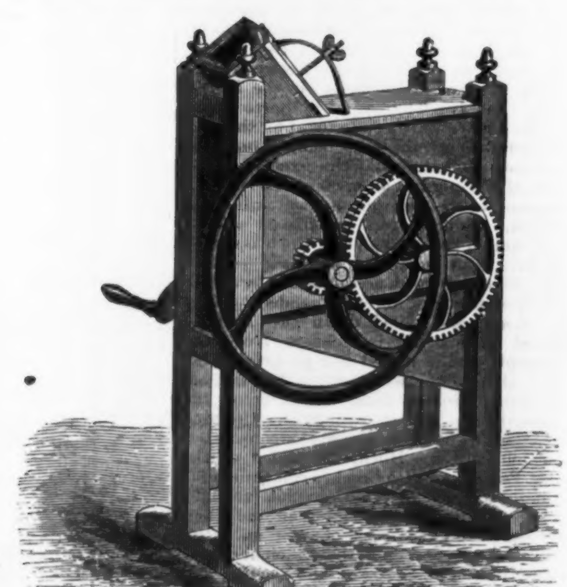

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Trade Mark, "ANCHOR BRAND."

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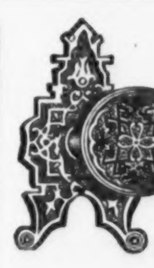

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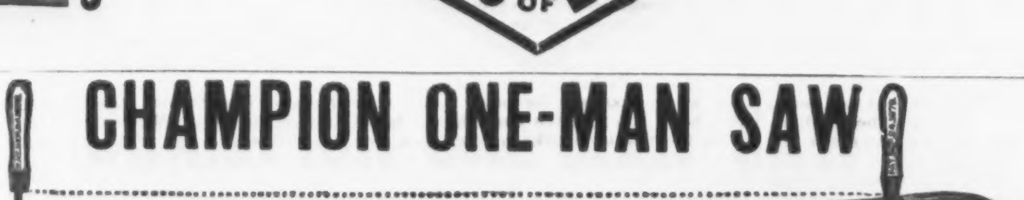
MANUFACTURERS OF LOCKS AND HARDWARE.

CHAMPION ONE-MAN SAW



WITH PATENT ADJUSTABLE ATTACHMENT. The only Saw that can be adjusted for either a One-Man or a Two-Man. We make the following lengths, 3½, 4, 4½, 5 feet. Send for sample.

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Relative Value of Iron and Steel Rails.

The following circular to railroad men, showing the comparative cost of steel and iron rails, was issued February 1, 1868, by Mr. Philip S. Justice, of Philadelphia, the first importer of steel rails into the United States:

Having been the first, as well as the largest, importer of steel rails into the United States, the undersigned begs leave to ask the attention of railway men to the estimates below given, showing the comparative costs, with interest account added, of steel and iron rails during a period believed to be the average lifetime of a good steel rail in the main line of track of any of our leading railways, and assuming that iron rails under similar conditions would have to be taken up and re-rolled every five years. The endurance of steel rails in England has already reached to 25 times that of the iron rail under the same tests, and we are rapidly approaching similar results in this country. Hence it is not deemed unreasonable to assume the maximum ratio given in this estimate. By reference to the table it will be seen, however, taking the endurance of steel at only four times greater than iron rails, the cost of the iron rails exceeds that of steel by $4400 per mile (allowing 100 tons to the mile), and, granting 10 times the endurance for steel, the excess of cost in the iron over steel will be $48,500 per mile; while with 20 times the endurance for steel it would reach the sum of $194,000 per mile in favor of the steel. It will thus be seen that on roads with 500 miles of single track the saving would reach respectively for the periods stated above the enormous sums—$2,200,000, $24,250,000, $97,000,000. The interest account is taken at 6 per cent. per annum, and the prices are the current ones for the best rails, at this date, in currency. A large gain in favor of steel might justly be added for saving to rolling stock, freedom from accidents, &c.

	Steel. In 20 years. Per ton.	Iron. In 20 years. Per ton.	Steel. In 50 years. Per ton.	Iron. In 50 years. Per ton.	Steel. In 100 years. Per ton.	Iron. In 100 years. Per ton.
Original cost of rails	$150	$80	$150	$80	$150	$80
Interest on steel at $150, and iron rails at $80	180	96	450	240	900	480
Rerolling iron at end of 5th year, $30 per ton		30		30		30
Interest on $30 (rerolling cost) for 15, 45 and 95 years respectively		27		81		171
Rerolling iron at end of 10th year		30		30		30
Interest on $30 (rerolling cost) for 10, 40 and 90 years		18		72		162
Rerolling iron at end of 15th year		30		30		30
Interest on $30 (rerolling cost) for 5, 35 and 85 years		9		63		153
Rerolling iron at end of 20th year		30		30		30
Interest on $30 (rerolling cost) for 30 and 80 years				54		144
Rerolling iron at end of 25th year				30		30
Interest on $30 (rerolling cost) for 25 and 75 years				45		135
Rerolling iron at end of 30th year				30		30
Interest on $30 (rerolling cost) for 20 and 70 years				36		126
Rerolling iron at end of 35th year				30		30
Interest on $30 (rerolling cost) for 15 and 65 years				27		117
Rerolling iron at end of 40th year				30		30
Interest on $30 (rerolling cost) for 10 and 60 years				18		108
Rerolling iron at end of 45th year				30		30
Interest on $30 (rerolling cost) for 5 and 55 years				9		99
Rerolling iron at end of 50th year				30		30
Interest on $30 (rerolling cost) for 50 years						90
Rerolling iron at end of 55th year						30
Interest on $30 (rerolling cost) for 45 years						81
Rerolling iron at end of 60th year						30
Interest on $30 (rerolling cost) for 40 years						72
Rerolling iron at end of 65th year						30
Interest on $30 (rerolling cost) for 35 years						63
Rerolling iron at end of 70th year						30
Interest on $30 (rerolling cost) for 30 years						54
Rerolling iron at end of 75th year						30
Interest on $30 (rerolling cost) for 25 years						45
Rerolling iron at end of 80th year						30
Interest on $30 (rerolling cost) for 20 years						36
Rerolling iron at end of 85th year						30
Interest on $30 (rerolling cost) for 15 years						27
Rerolling iron at end of 90th year						30
Interest on $30 (rerolling cost) for 10 years						18
Rerolling iron at end of 95th year						30
Interest on $30 (rerolling cost) for 5 years						9
Rerolling iron at end of 100th year						30
Relaying iron 4, 10 and 20 times, at $6 each		24		60		120
Total cost of 1 ton iron rails in 20 years		$374				
" " steel "	$330	330				
" " iron " 50 years				$1,085		
" " steel "			$600	600		
" " iron " 100 years						$2,990
" " steel "					$1,050	1,050
Balance in favor of 1 ton steel rails in 20 years, wear on main line of track		$44				
Balance in favor of 1 ton steel rails in 50 years, wear on main line of track				$485		
Balance in favor of 1 ton steel rails in 100 years, wear on main line of track						$1,940

Total saving in favor of steel for one mile (say, 100 tons) in 20 years	$4,400
" 50 years	48,500
" 100 years	194,000
Total saving in favor of steel rails for 100 miles in 20 years	440,000
" " " 100 miles in 50 years	4,850,000
" " " 100 miles in 100 years	19,400,000

Weak Manholes in Boilers.

The success of the horizontal tubular boiler in our large cities, says the *Locomotive*, has led to its trial and successful employment in many other localities hitherto deemed unfitted for tubular boilers, owing to the nature of their feed waters. In the old-style construction, with staggered tubes and as many of them as could possibly be crowded into the alloted space, there was but one way to remove scale properly, viz., taking out the tubes—which was objectionable on account of the loss of time required in work of removal, cleaning off, piecing out and replacing the tubes, with generally an additional outlay for some new tubes to replace those burned or worn out. In the tubular boiler in its newer form, specially adapted for bad waters, several of the lower rows of tubes are left out, which affords a clear space of some 15 inches between bottom row of tubes and bottom shell of boiler at its deepest point. A manhole in front, head underneath the tubes, affords an easy access to the interior of the boiler, facilitates the work of cleaning and removal of scale and deposit, and further adds to the boiler's efficiency by improving its circulation.

The tubular type of boiler, of course, is common property, in which each builder has his own ideas of what its construction should be, often adding some important kink of his devising. In the main, these contributions have been valuable and have made it the successful boiler of to-day, but among the many thousands built annually, occasionally one may be found which, though of first-class construction generally, in some important particulars may be little else than a copy of the weaknesses and defects of twenty years ago. Sometimes this is due more to a want of thought than to a deliberate intention to palm off inferior work, perhaps reproduced from the recollection of some old construction with which the builder was familiar. But we cannot disguise the fact that a determination to make a profit upon every piece of work, however low the price at which it was secured, and lack of skilled supervision in the interest of the purchaser during construction, accounts for much of the inferior work of other manufacturers.

It will, we think, be apparent that in cutting away so much of the material composing the front head as may be necessary for the manhole opening, usually 11 x 15 inches, we remove 11 x 15 x .7854 = 129.59 superficial square inches; assuming the head to be ½ inch thick, this would be equal to 64.79 sectional square inches. In addition to this, the location of the manhole, when fully available, involves the loss of the lower tubes and their holding power in staying the heads—we are now simply considering the tube as a stay, not its evaporative efficiency. No doubt the advantage in having clean fire-sheets more than compensates for the loss of these lower tubes, which, as has been repeatedly demonstrated, are of little importance, and inappreciable in the boiler's performance. But it is not alone the weakening effect of cutting away so much of the boiler head without providing reinforcement. Corrosion is sure to result from the springing of the weak, unstayed section bordering the opening, resulting in a leaky joint, followed by vain efforts to tighten the joint, and so stop the leak by excessive screwing up of the plate, causing successively distortion, fracture and ultimate rupture. Boilers have failed under a hydrostatic-test pressure from structural weakness of this kind, and it has been a fruitful cause of steam-boiler explosions.

A case in point from our practice was that of two new boilers, 60 inches in diameter, heads $\frac{7}{16}$ inch thick, containing 46 4-inch tubes, having unstrengthened manholes under tubes in front head. This manhole opening was without an internal frame, strengthening ring or stays of any description. Upon reporting this, with a recommendation that this dangerously weak point should be properly reinforced, one report was inclosed to the builder of the boiler, who replied that reinforcement of a manhole of the description was not only unnecessary, but would weaken instead of strengthening the boiler. The owners of the boiler were unfortunately persuaded to this view and declined to make the additions necessary to properly strengthen the manholes, which we deeply regretted, for they employ many persons who work within range of these dangerously constructed boilers. As for ourselves, we shall be careful, when in that vicinity, to pass by on the other side and give them the widest possible berth.

A Buggy with but One Wheel.—The Chicago *Tribune* says: "A reporter recently investigated the Chicago Single-Wheel Buggy Co., whose incorporation, with a capital of $1,800,000, was telegraphed from Springfield. He found Mr. Fred Binder, one of the incorporators, to be the smiling dispenser of amber lager beer in an Adams street saloon, and through him became acquainted with Mr. W. Vogel, the inventor of the single-wheel buggy. Both gentlemen admitted that they were interested in the $1,800,000 enterprise, and did not deny that they expected to make mountains of money with Mr. Vogel's invention. The latter consists of a wheel which will be attached to a horse by means of a pair of buggy shafts, and which will carry at the other end a buggy seat. The inventor claims that by means of this new contrivance absolute safety in driving is secured, as the wheel can only tip or turn over in case the horse does the same thing. Besides, he claims that his new vehicle can get anywhere where a horse can get, and that the horse will be able to make greater speed in this contrivance than in any sulky of the old pattern."

According to foreign reports, Sir Charles William Siemens has publicly given notice of his intention to drop his baptismal name of Charles, and desires to be known henceforth as Sir William Siemens.

The Evaporative Power of Bituminous Coals.*

BY WM. KENT, M. E.

(Concluded from page 7, July 5.)

I have prepared a table (Table I) which gives a selection of figures from various experiments on bituminous coals, including those of General Meigs, arranged as nearly as possible in geographical order. The table also contains the percentage of refuse obtained in the trial, and the percentage of volatile matter as determined by analysis, whenever these are given by the authorities consulted. Table II gives the analyses of those coals whose analyses are reported. The first portion of the table, headed "Continent of Europe," gives some of the results of the tests of Scheerer-Kestner and C. Meunier Dollfies, reported to the Société Industrielle de Mulhouse. The first six coals, whose percentages of volatile matter are given, are nearly similar in composition to the Pittsburgh coals, except that they have a much greater percentage of ash. As these same coals were not tested by any other of the authorities here noticed, the results are scarcely comparable with those of American coals, but one point is worthy of notice. The Ronchamp coal, although containing a very high percentage of ash, gives the highest evaporation, and it contains much less volatile matter, while the Louisenthal coal, containing less ash than the Ronchamp, but the highest percentage of volatile matter, gives the lowest evaporation. This corresponds with the results both of General Meigs and of Professor Johnson, in showing that the higher the percentage of volatile matter the lower is the evaporative power (as shown by their boilers—not as might be shown under better conditions).

In the English coals, which are all highly bituminous, we notice that the two results of Johnson agree very fairly with the average results of Delabeche and Playfair; that in Johnson's results the highest evaporation corresponds with the lowest percentage of volatile matter; that in Delabeche and Playfair's results the highest evaporation corresponds with the lowest percentage of oxygen and nitrogen, and *vice versa*, notwithstanding the fact that the lowest evaporation corresponds with the lowest amount of ash. I also observe that the results with General Meigs's boiler are lower than either Johnson's or Delabeche and Playfair's, and that the results of the "Little Giant" boiler are the lowest of all.

TABLE I.—EVAPORATIVE POWER OF BITUMINOUS COALS.

Number for reference.	Name of coal and location of mine.	Percentage of refuse by boiler test.	Percentage of volatile matter by analysis.	Pounds of water evaporated per pound of coal from and at 212°. Scheerer-Kestner and Meunier-Dollfus elephant boiler.	Prof. W. R. Johnson. Two-flue boiler.	Gen. W. C. Meigs. Meigs boiler.	Gen. W. C. Meigs. Little Giant boiler. Results divided by 0.843.	Babcock and Wilcox boilers.
	Continent of Europe.							
1..	Ronchamp	17.5	23.19	8.58				
2..	Friedrichsthall	18.4	33.79	7.55				
3..	Duttweiler	17.7	32.19	8.07				
4..	Louisenthal	16.9	38.42	7.18				
5..	Altenwald	16.1	31.86	8.18				
6..	Heinitz	12.	33.98	8.4				
7..	Sulzbach	14.0		7.79				
8..	Von der Heydt	16.3		7.61				
9..	Blanzy, Montceau	16.7		7.48				
10..	" anthracite	22.9		7.91				
11..	Creusot	10.7		9.17				
				Delabeche and Playfair.				
	England.							
12..	Newcastle. Average of 18			8.1				
13..	Derbyshire and Yorkshire. Average of 7			7.8				
14..	Lancashire. Average of 28			7.94				
15..	Liverpool	5.3	30.06		7.81			
16..	Newcastle	6.3	35.83		8.66			
17..	Davison, West Hartley	6.0				7.60		
18..	Cowpen, Newcastle on Tyne	6.1				7.52	6.07	
19..	" Cambois, West Hartley	6.2				7.04		
	Wales.							
20..	Welsh. Test in London	7.5						11.53
21..	Cardiff lump. Test in San Francisco. Avge. of 2	10.9						9.85
22..	Welsh. Average of 37			9.05				
	Scotland.							
23..	Scotch. Average of 8			7.70				
24..	"	10.8	39.19		6.95			
25..	" splint	6.7				7.61	6.25	
26..	Ardrossan. Fergushill	5.0					6.10	
27..	Scotch. Test at Greenock	7.0						11.52
	Nova Scotia.							
28..	Pictou. Average of 2	12.8	26.00		8.63			
29..	Sidney	6.4	23.81		8.11			
	Pennsylvania.							
30.	Dauphin. Susquehanna	16.5	13.82		9.34			
31..	Lycoming Creek	13.1	13.84		8.91			
32..	Blossburg	11.5	14.78		9.72			
33..	Quin's Run	9.3	17.97		10.27			
34..	Karthan's	8.0	19.53		9.09			
35..	Cambria Co	9.5	20.52		9.24			
36..	Pittsburgh	9.5	36.76		8.20			
37..	Standard C. Co., Brothers Valley, Somerset Co.	11.0				9.85	10.00	
38..	Philson Iron & Coal Co., Berlin, Somerset Co	9.1				9.75		
39..	Simpson Horner & Sons, near Pittsburgh	7.9				9.07	7.81	
40..	Thos. Fawcett & Sons, near Pittsburgh	6.0				8.78	6.74	
41..	Geo. Lysle & Sons, near Pittsburgh	5.5					7.62	
42..	Hornet Coal Co., near Pittsburgh	5.4					7.22	
43..	Powelton, 1400 lbs. mixed with 2790 anth. scr'gs.	8.8						11.32
44..	Johnstown, Cambria Co. Fine slack	25.1	13.24					9.59
45..	Pittsburgh. Fine slack	12.3						8.12
46..	" 3d pool. Lump	4.8						10.47
47..	Castle Shannon, near Pittsburgh. Nut	13.						8.90
48..	" " Lump	9.	31.69					10.13
49..	" " ⅜ nut, ⅝ lump	10.5						10.00
	Maryland.							
50..	Cumberland. Blan Avon Mine	8.3					9.96	
51..	Average of 5 Md. free-burning bituminous	11.03	14.21		9.99			
				Isherwood.				
52..	Cumberland	8.25		9.69				
	Virginia.							
53..	Average of 10 coking coals in Richmond	11.47	30.36		8.50			
	West Virginia.							
54..	West Virginia splint. Paint Creek, W. Va	8.1				8.34	8.34	
	Tennessee.							
55	Battle Creek. South Pittsburgh	6.6					6.76	
56..	Coal Creek, near Knoxville	5.6					6.75	
	Ohio.							
57..	Kyle Coal Co. S. e. of Youngstown	4.8					6.82	
58..	Vienna Coal and Iron Co	6.1					6.71	
59..	Hubbard Mine	5.1					5.08	
60..	Jackson Co. nut	9.6						8.93
	Indiana.							
61..	Indiana Cannel. Daviess Co	24.8				7.32	7.12	
62..	Indiana Block							9.47
	Illinois.							
63..	Illinois. Run of mine							9.49
64..	Staunton. Fine nut	17.7	57.11					5.09
	Missouri.							
65..	Lexington Coal Shaft	12.2					6.51	
	Nebraska.							
66.	Rocky Mountain Rocky Spring Mine	6.5				6.01	4.93	
	Kansas.							
67..	Leavenworth Coal Shaft	11.1				6.49	6.42	
	Indian Territory.							
68..	Macallester, Tobosky Co	5.8				7.68	6.9	
	Texas.							
69..	San Antonio Mining Co., near San Antonio	11.5					4.46	
	Colorado.							
70..	Mitchell & Co., La Plata, near St. Louis	10.0				7.40		
71..	Cannon Coal. Fremont Co	10.				6.45	6.01	
72..	Trinidad, Starksville	14.8					8.59	
73..	El Moro, near Trinidad	15.8					8.04	
	New Mexico.							
74..	Los Cerillos bituminous. Ortez Grant	13.3				8.60		
	Utah.							
75..	Weber. Chalk River, Summit Co	10.				4.73	3.79	
	Dakota.							
76..	Lignite. Fort Stevenson	6.2				4.03	4.47	
	Montana.							
77..	Chestnut Mine. Rock Creek Canon	32.4				6.07	6.15	
	California.							
78..	Pittsburgh. Mt. Diablo Mine, Somersville	11.				5.05	4.34	
	Pacific Coast Brown Coals.							
79	Wahsatch Range.. / Mt. Diablo, Cal. ... / Coos Bay, Ore. ... / Seattle, Wash Ter. — Average	13.18		Isherwood. 5.99				
	Oregon.							
80..	Eastport, Coos Bay	8.8				5.24	5.73	
	Washington Territory.							
81..	Brown coal. Bellingham Bay	23.48		6.13				
82..	Seattle screenings	13.4						6.86
83..	" " wet	10.7						7.46
84..	" lump	9.5						6.68
	Vancouver's Island.							
85..	South Wellington. Departure Bay	8.2				7.59	7.07	
86..	Nanaimo, Chase River	13.2				7.30	6.60	
87..	Wellington. Departure Bay	9.4				6.71	6.69	
88..	" Screenings	8.3						7.89
89..	" Lump	13.8						9.02
90..	East Wellington screenings	16.8						7.80
91..	Brown coal. Nanaimo	12.7		7.36				
	New South Wales.							
92..	Wallsend, Sydney, Newcastle	8.8					7.11	
	Best Pennsylvania Anthracite Performances, for comparison.							
	Forrest Improvement, Schuylkill, Co	7.0			10.25			
	" " " "	10.6				9.37		
	" " " "	13.5					10.29	
	Lea Colliery, Wilkesbarre	11.0						10.52

In the Welsh coals, in Delabeche and Playfair's results, we notice that, although the percentage of ash is higher than in the Newcastle coals, the evaporation is much higher; and here also we trace the effect of lower oxygen, nitrogen and hydrogen in increasing evaporative power (in their experiments). The tests by the Babcock & Wilcox boilers, both in London and San Francisco, give results very much higher than Delabeche & Playfair's, the probable cause of which will be noticed hereafter. In the Scotch coals, we are fortunate in having both Johnson's and Delabeche and Playfair's analyses, and the results of tests by five different authorities. Delabeche and Playfair's analyses show it to be very nearly the same as the Lancashire coals, and their evaporative tests of the two coals show nearly the same results. They show also that, although the Scotch coal has a little less ash than the Welsh, its evaporative power is very much less, and this we connect with its higher percentage of oxygen, nitrogen and hydrogen. The English and the Scotch coals appear very nearly alike in both General Meigs's and the "Little Giant" boiler tests; but in both, and especially in the latter, both coals give very much poorer results than in any other boiler. For some unexplained reason, the Scotch coal figures the lowest in the whole list of Johnson—more than 20 per cent. lower in evaporative power than Newcastle coal.

Since we have Delabeche and Playfair's analysis of Scotch and Welsh coals to compare with their evaporative tests, we may ascertain whether the difference in analysis is sufficient to account for the difference in evaporative results. From the formula, Heating power $= 14{,}500\,[C + 428\,(H - \frac{O}{8})]$, we obtain the theoretical heating power of the Welsh coal, 14,816 heat units, equivalent to an evaporation of 15.35 pounds of water from and at 212°, and for the Scotch coal, 14,136 heat units, equivalent to an evaporation of 14.65 pounds. As the actual results obtained were respectively 9.05 and 7.70 pounds, they show that Delabeche and Playfair obtained in actual test 59 per cent. of the theoretical heating power of the Welsh coal, and only 52.5 per cent. of the heating power of the Scotch coal, an economic result in favor of the Welsh coal of 12.4 per cent. $\left(\frac{59-52.5}{52.5}\right)$. Johnson obtained 47.4 per cent. of the theoretical heating power of the Scotch coal; the Meigs boiler, 51.9 per cent.; the "Little Giant" boiler (results divided by 0.843), 42.2 per cent., and the Babcock & Wilcox boiler, 78.6 per cent., provided, of course, that the particular coals used in each of these tests had the same theoretical heating power.

But little can be said of the Nova Scotia coals, as we have only Johnson's two tests for comparison. The Pictou and Sidney coals seem an exception to the rule already noticed, that the higher evaporative power corresponds, under usual conditions, with lower percentage of volatile matter as well as lower percentage of ash.

Coming to the Pennsylvania coals, we notice a group tested by Johnson, Nos. 30 to 35 inclusive, which are classed as semi-bituminous, having from 13.82 to 20.52 per cent. of volatile matter. They are especially noticeable from the fact that, notwithstanding their rather high percentages of ash, they show the highest evaporative powers on Johnson's whole list. The two coals of Somerset County, Nos. 37 and 38, tested by General Meigs, are coals of similar character, and they give the highest result of any bituminous coals tested by him in the tests with the Meigs boiler—higher results even than any of the six anthracites. The high steaming quality of these coals is confirmed by the Babcock & Wilcox test of Cambria coal No. 44, containing only 13.24 per cent. of volatile matter. Notwithstanding the very high percentage (25.1) of ash, the test showed an evaporation of 9.59 pounds of water per pound of coal, and 12.80 per pound of combustible, which latter figure exceeds the figures obtained in the tests of Scotch and Welsh coal.

For a fair comparison with these coals we may turn to the Maryland coals, where Isherwood's, Johnson's and the "Little Giant" tests all give high figures, and which are remarkably close ones—9.69, 9.99 and 9.96. The Cumberland coal ranks second highest of the 50 bituminous coals tested in the "Little Giant" boiler, and also the highest in Johnson's tests. It would appear that these volatile coals, containing from 13 to 20 per cent. of volatile matter, notwithstanding occasionally high percentages of ash, prove good steaming coals under a variety of conditions and in a variety of boilers. They seem especially adapted to marine, vertical, tubular and other internally-fired boilers, which have heating surfaces all around the fire, and no special appliances for promoting perfect combustion.

TABLE II.—ANALYSIS OF BITUMINOUS COALS.

Corresponding number in Table I.	Name of coal.	Carbon.	Hydrogen.	Nitrogen and oxygen.	Moisture.	Ash.	Fixed carbon.	Volatile matter.	Authority.
	Continent of Europe								
1..	Ronchamp	76.21	4.06	1.	5.01		12.8	58.11	27.10	Kestner and Dollfus.
2..	Friedrichsthall	67.61	4.19	0.5	11.8	1.	12.7	47.11	33.79	do.
3..	Duttweiler	71.1	4.8	0.5	0.15	1.75	11.75	54.11	32.19	do.
4..	Louisenthal	4.6	3.91	0.5	15.12	1.87	12.38	49.19	38.42	do.
5..	Altenwald	69.3	4.26	0.5	9.9	2.54	13.5	51.62	31.86	do.
6..	Heinitz	70.3	4.3	0.5	11.51	1.79	11.57	54.45	31.98	do.
7..	Sulzbach	74.3	4.43	10.75			10.46			do.
8..	Von der Heydt	72.05	4.46	12.05			1.40			do.
9..	Blanzy, Montceau	70.50	4.49	14.53			10.28			do.
10..	" Anthracite	68.1	3.7	6.13			21.06			do.
11..	Creusot	81.74	3.05	4.04			3.01			do.
	England, Scotland and Wales.									
12..	Newcastle. Average of 18	82.12	5.31	1.35	5.69		3.07			Delabeche and Playfair.
13..	Derbyshire and Yorkshire. Average of 7	79.68	4.94	1.41	10.28		2.64			do.
14..	Lancashire. Average of 28	77.90	5.32	1.31	9.53		4.88			do.
15..	Liverpool					.89	4.60	54.0	30.06	Johnson.
16..	Newcastle					2.01	5.4	57.	35.83	do.
22..	Welsh. Average of 37	83.78	4.79	0.98	4.15		4.91			Delabeche and Playfair.
23..	Scotch. Average of 8	78.53	5.61	1.00	9.69		4.03			do.
24..	Scotch					1.01	9.14	48.81	39.19	Johnson.
..	Glasgow. Average of splint and cherry	82.06	5.41	11.19			1.28			Dr. Richardson.
..	Boghead. Linlithgowshire	63.94	8.86	0.96	4.70	0.84	21.4	9.54	67.95	Dr. Penny.
	Nova Scotia.									
28..	Pictou. Average of 2					1.68	12.05	58.86	26.90	Johnson.
29..	Sidney					3.13	5.49	67.57	23.81	do.
	Pennsylvania.									
30..	Dauphin and Susquehanna					.45	11.79	74.24	13.82	do.
31..	Lycoming Creek					.67	13.06	72.13	13.84	do.
32..	Blossburg					1.34	10.77	73.11	14.78	do.
33..	Quin's Run					.84	8.41	72.79	17.97	do.
34..	Karthan's					1.28	7.00	71.79	19.53	do.
35..	Cambria Co					2.46	9.1	68.37	20.52	do.
36..	Pittsburgh					1.4	7.01	54.93	36.76	do.
44..	Johnstown, Cambria Co					0.79	8.77	77.92	13.24	Hunt and Clapp.
48..	Castle Shannon, near Pittsb'rgh					1.51	3.92	61.88	31.69	do.
..	Pittsburgh "Cincinnati smoke-prevention tests"					2.31	3.64	61.03	32.75	B. Kniffler.
	Maryland.									
51..	Average of 5 free-burning bit.					1.25	9.49	75.45	14.21	Johnson.
52..	Cumberland	80.55	4.50	1.08	2.70	1.75	8.25			Isherwood.
	Virginia.									
53..	Average of 10 coking coals, near Richmond					1.62	10.58	58.30	30.36	Johnson.
	Illinois									
64..	Staunton. Fine nut					6.27	10.39	26.30	57.11	Hunt and Clapp.
	Pacific Coast.									
79..	Average of 4 brown coals	50.05	3.85	0.91	13.63	16.82	13.18			Isherwood.
	Washington Territory.									
81..	Brown coal. Bellingham Bay	49.6	3.30	0.83	8.96	12.52	23.48			do.
	Vancouver's Island.									
91..	Brown coal. Nanaimo	59.68	4.08	1.00	10.78	10.26	12.74			do.

With No. 36 in the Pennsylvania coals we strike a very different quality of coals from the above. The Pittsburgh or Monongahela River coals are the type of this class. They generally have small percentages of ash and high percentages of volatile matter—30 to 40 per cent.—approaching in composition the English, Scotch and Welsh coals, although not often found as pure as the latter. With these coals we reach the real difficulties of burning bituminous coals, and in consequence the results obtained under varying conditions and with various boilers differ widely. We notice that Pittsburgh coal No. 40 gave an evaporation of only 6.74 pounds in the "Little Giant" boiler, and 8.87 in the boiler of General Meigs. Johnson found 8.20 for a Pittsburgh coal, while the Babcock & Wilcox tests gave from 8.12 for fine slack to 1047 for lump (No. 46).

Still more discordant results than these have been obtained from the same identical lot of Pittsburgh coal, when burned under different boilers, in different furnaces. At the Cincinnati Exposition of 1879, Mr. John W. Hill made five tests, in as many different furnaces, of Pittsburgh coal No. 2, all of the furnaces having been designed for "smoke consumers." The evaporation per pound of coal from temperature of feed varied from 5.839 to 9.688 pounds; but according to Mr. Hill's corrections for "heat in the steam," it varied from 4.828 to 12.450 pounds.

The Virginia coals tested by Johnson contain, on an average, less volatile matter than the Pittsburgh coals, and follow the general rule of showing a correspondingly higher evaporation.

The bituminous coals west of Pittsburgh were not tested by Johnson, and the tests of General Meigs do not show the analyses, so that we have scarcely enough data for comparison. We notice, however, the very low figures, 6.82 pounds and under, for the coals of Tennessee, Ohio and Nebraska, all of which contain less than 7 per cent. of refuse. The high results obtained by the Babcock & Wilcox boiler from Illinois "run of mine" coal (name of mine not known) and Indiana block coal—9.49 and 9.47 respectively—are noticeable, but, as we have not the analysis, no accurate conclusion can be drawn from them.

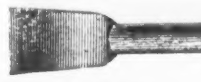
We come now to a very peculiar coal, from Staunton, Ill., tested under a Babcock & Wilcox boiler, at Springfield, Ohio, which gives the figure 5.09—remarkably low, as compared with all the other Babcock & Wilcox tests. As shown in Table III, the test was made with the same boiler that was used in testing the Jackson (Ohio) nut coal, which gave an evaporation of 8.93. Not only were the economic results obtained from this Staunton coal very low, but the capacity of the boiler was largely reduced while using it, so that while 460 horse-power had been developed with 48 square feet of grate surface with the Ohio coal, only 246 horse-power was obtained with 60 square feet of grate surface with the Staunton coal. To explain this anomalous result, we must turn to the analysis. It shows only 26.30 per cent. of fixed carbon and 57.11 per cent. of volatile matter, and is thus totally unlike all the other coals whose analyses are given in connection with boiler tests, the nearest approach to it being the Liverpool coal in Johnson's test, which had more than twice as much fixed carbon, and only 39.96 per cent. volatile matter. There is one coal in the list of analyses, Table II, of which, however, there is no boiler test reported, which is the only coal analysis I have found showing a higher percentage of volatile matter than the Staunton coal, and that is the Boghead coal, from Linlithgowshire, Scotland, which, according to Dr. Penny, contains 67.95 per cent. of volatile matter, and only 9.54 per cent. of fixed carbon.

I regret not to be able to give a complete ultimate analysis of the Staunton coal, from which to determine its theoretical heating value; but if it shows a relatively high percentage of hydrogen, and a small percentage of oxygen, nitrogen and moisture, as does the Boghead coal, then its theoretical power must be high, and the only reason it did not give good results in the boiler test must be that it was not properly burned. A broad distinction must be drawn here between the boiler used to absorb the heat developed from burning coal and the furnace under the boiler in which the coal was burned. There can be no question in this case as to whether the boiler had sufficient absorbing surface, for if it could develop 460 horse power with an evaporation of 4.11 pounds of water per square foot of heating surface per hour, and 8.93 pounds of water per pound of coal, it should be able, with even greater economy, to develop only 246 horse-power at a rate of evaporation of only 2.27 pounds of water per square foot of heating surface per hour, if the coal had been burned in the furnace.

TABLE III.—EVAPORATIVE POWER OF BITUMINOUS COALS.—TESTS WITH BABCOCK & WILCOX BURNERS.

No.	Date of test.	Place of test.	Name of coal.	Duration of test. H. M.	Average temperature of feed.—Degrees.	Aver'ge steam pressure.—Lbs.	Grate surface.—Sq. ft.	Heating surface.—Sq. ft.	Pounds of coal burned.	Percentage of refuse.	Coal burned per sq. foot of grate.—Pounds.	Water evaporated.—Pounds.	Water evaporated per sq. ft. of heating surface per hour.—Pounds.	Water per pound coal from and at 212°.—Pounds.	Water per pound combustible from and at 212°.	Rated horse-power.	Horse-power developed.
1	Oct. 30, 1882	London, England	Welsh	13 30	130	67	40.	1,670	3,360	7.5	6.3	34,800	2.07	11.53	12.46	146	98
2	Nov. 14, 1882	Greenock, Scotland	Scotch	3 ..	156	36	25.	1,403	1,344	7.0	13.7	14,420	2.78	11.52	12.38	122	129
3	Dec. 15, 1882	Peacedale, R. I.	Anthracite screenings, 2790 pounds.. / Powelton, Pa., bituminous, 11,400 lbs	10 15	38	77	60.	3,126	14,359	8.8	17.6	133,096	4.32	11.32	12.42	270	448
4	July 19, 1882	Cincinnati, Ohio	Pittsburgh fine slack	4 ..	74	52	33.7	1,679	7,365	12.1	21.9	51,459	4.47	8.12	9.25	[illegible]	[illegible]
5	Sept. 7, 1882	" "	Pittsburgh, 3d pool, lump	10 ..	132	61	44.5	2,760	12,000	4.8	27.3	112,6[illegible]	4.78	10.47	11.00	[illegible]	419
6	March 12, 1883	Pittsburgh, Pa	Castle Shannon, near Pittsburgh, nut	6 45	37	95	69.1	4,784	13,000	13.	27.9	95,280	3.63	8.06	10.2	416	536
7	Mar. 13-15, 1883	"	" " lump	25 15	37	95	69.1	4,784	33,000	9.	22.9	310,533	3.44	10.13	11.13	416	504
8	Mar. 15-17, 1883	"	" " ⅜ nut, ⅝ lump	42 15	37	95	69.1	4,784	83,524	10.5	27.9	683,056	4.13	10.00	11.17	416	570
9	Sept. 18-23, 1882	Chicago, Ill	Illinois "run of mine"	6 dys	190	75	..	1,196	10,675	..	....	95,946	1.41	9.49	....	104	84
10	Jan. 8-10, 1883	"	Indiana block, "very good"	3 dys	190	85	..	1,156	11,150	..		99,676	2.95	9.47	....	104	114
11	Dec. —, 1882	Springfield, Ohio	Jackson, Ohio, nut	8 ..	117	00	48.	3,358	12,338	9.6	32.1	97,024	4.11	8.93	9.88	252	461
12	May 2, 1883	" "	Staunton, Ill., fine nut	8 ..	155	97	60.	3,358	12,034	17.7	25.1	55,614	2.27	5.09	6.19	252	246
13	May 28, 1883	Johnstown, Pa	Johnstown fine slack	7 45	90	80	51.	3,126	6,174	25.1	15.6	50,936	2.44	9.59	12.80	272	246
14	Feb. 10, 1883	San Francisco, Cal.	Renton screenings	5 10	56	106	21.2	1,564	3,910	13.3	31.5	22,266	2.05	6.88	7.98	136	150
15	" 12, 1883	" "	" "	6 ..	57	99	21.2	1,564	4,346	23.	34.8	24,282	3.12	6.71	8.71	136	161
16	" 13, 1883	" "	Wellington screenings	6 30	57	110	21.2	1,564	3,740	18.3	27.	24,547	2.93	7.80	9.55	136	151
17	" 16, 1883	" "	East Wellington screenings	6 ..	57	107	21.2	1,564	3,740	16.8	28.3	24,282	3.11	7.80	9.38	136	160
18	" 17, 1883	" "	Black Diamond screenings	5 58	57	107	21.2	1,564	4,640	19.3	36.4	24,28	3.11	6.23	7.70	136	163
19	" 19, 1883	" "	Seattle screenings	6 24	58	116	21.2	1,564	4,260	11.4	31.3	24,282	2.91	6.86	7.92	136	150
20	" 20, 1883	" "	Wellington lump	6 19	59	119	21.2	1,564	3,717	13.8	28.2	28,120	3.12	9.02	10.46	136	179
21	" 21, 1883	" "	Seattle screenings, wet	6 ..	60	119	21.2	1,564	3,915	10.7	30.7	24,282	3.11	7.46	8.35	136	161
22	" 22, 1883	" "	Cardiff lump	6 47	60	114	21.2	1,564	3,863	11.6	26.7	32,376	3.69	10.07	11.40	136	180
23	" 27, 1883	" "	"	7 21	62	117	21.2	1,564	4,032	19.1	25.6	32,376	3.35	9.62	11.89	136	179
24	" 28, 1883	" "	South Plains lump	6 35	62	121	21.2	1,564	4,059	13.9	28.9	30,345	3.53	8.96	10.41	136	184
25	Mar. 1, 1883	" "	Seattle lump	6 5	63	118	21.2	1,564	4,120	9.5	34.1	28,329	3.57	7.68	8.49	136	182

* A paper read at the Cleveland meeting of the American Society of Mechanical Engineers.



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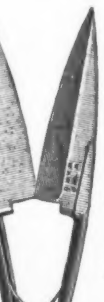

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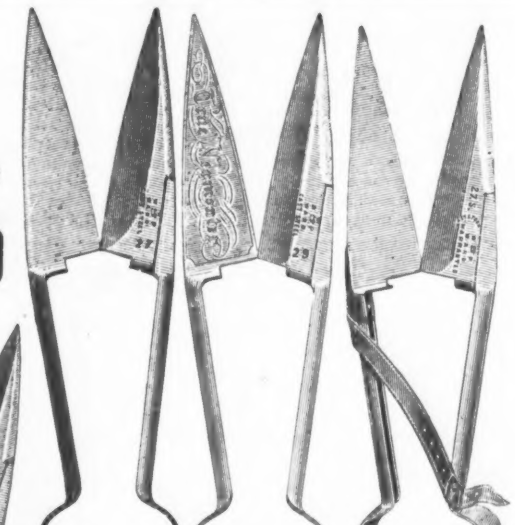

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For the *Upper Lake region*, partly cloudy weather, occasional **rain,** winds mostly westerly ; stationary or lower temperature, higher pressure.

For the *Upper Mississippi and Missouri valleys*, partly cloudy weather, occasional **rain,** variable winds, mostly westerly ; stationary or higher temperature and pressure.

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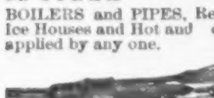

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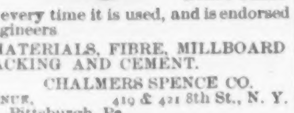

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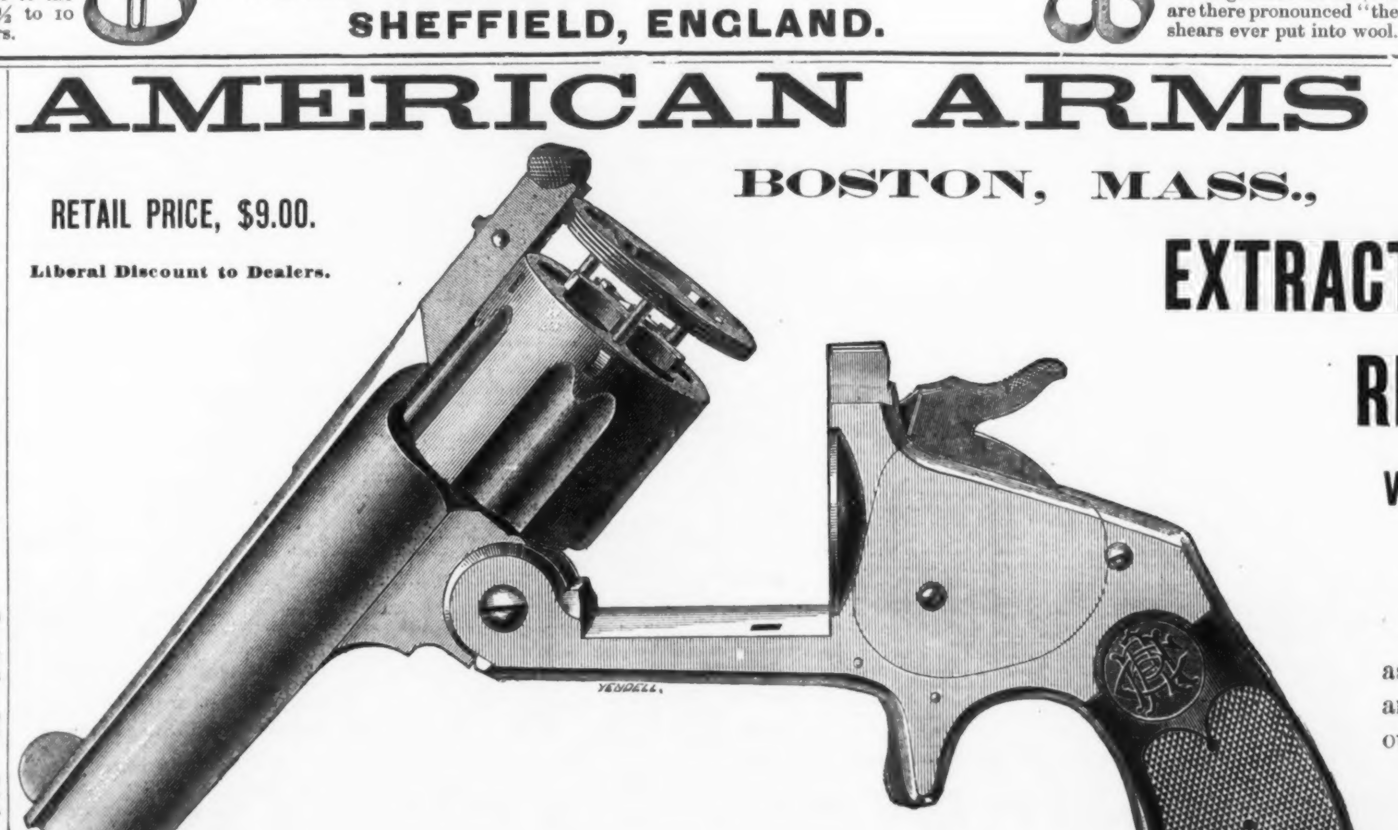

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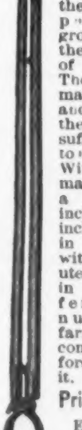

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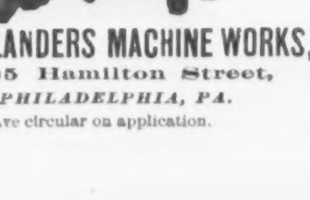

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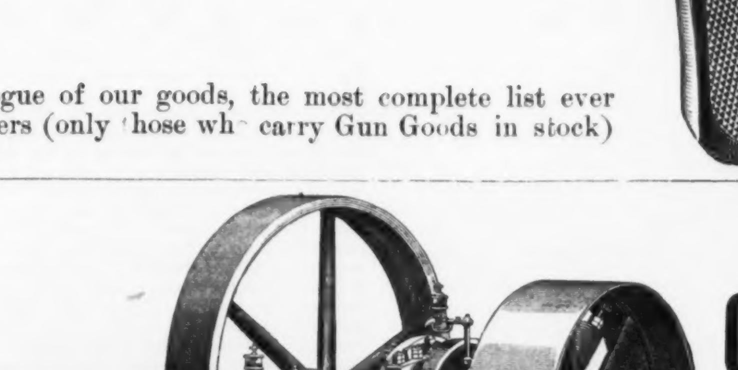

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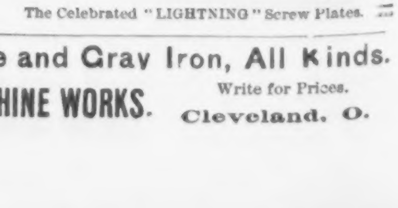

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the boiler would have absorbed the heat. The conclusion is that the furnace under the boiler, or possibly the method of firing, which was well adapted to Jackson (Ohio) coal, was not well adapted to Staunton (Ill.) coal, and further experiments with various kinds of furnaces should be made to determine what furnace is best adapted to it.

This paper has already grown to sufficient length, without entering upon the subject of the character of furnace best adapted to burn the different qualities of bituminous coals. In fact, there are not enough data existing for a proper treatment of this very important subject. I may briefly state that my present opinion is that almost any kind of a furnace will be found well adapted to burning anthracite coals and semi-bituminous coals containing less than 20 per cent. of volatile matter; that probably the best furnace for burning those coals which contain between 20 and 40 per cent. volatile matter, including the Scotch, English, Welsh, Nova Scotia and the Pittsburgh and Monongahela River coals, is a plain grate-bar furnace, with a fire-brick arch thrown over it, for the purpose of keeping the combustion chamber thoroughly hot; that the best furnace for coal containing over 40 per cent. volatile matter will be a furnace surrounded by fire-brick, with a large combustion chamber and some appliance for introducing very hot air to the gases distilled from the coal, or preferably a separate gas producer and combustion chamber, with facilities for heating both air and gas before they unite in the combustion chamber. The character of furnace to be especially avoided in burning all bituminous coals containing over 20 per cent. of volatile matter is the ordinary furnace in which the boiler is set directly above the grate bars, or in which the heating surfaces of the boiler are directly exposed to radiation from the coal on the grate. The question of admitting air above the grate, which was favorably settled by Chas. Wm. Williams, 40 years ago, is again unsettled. The London *Engineer* recently said: "All our experience, extending over many years, goes to show that when the production of smoke is prevented by special devices for admitting air, either there is an increase in the consumption of fuel or a diminution in the production of steam. * * * The best smoke preventer yet devised is a good fireman."

The English and French experiments on the evaporative power of bituminous coals are of little value for this country, since the coals described in these experiments were of limited variation in composition. Johnson's experiments are of little value, since they included no bituminous coals west of Pittsburgh. General Meigs's experiments are worthless, since neither of his boilers was adapted to the thorough combustion of highly bituminous coal. The Babcock & Wilcox boiler tests are valuable in showing that, with proper furnace settings, very much higher results can be obtained from the highly bituminous coals than would have been believed from the experiments of Johnson and Meigs. Their great demerit is that they are not sufficiently extensive. Table IV gives the details of the Babcock & Wilcox tests, as far as I have been able to obtain them; this complete list has not hitherto been published. All of these tests were made with the furnace supplied with a fire-brick arch, for preventing the radiation of heat from the grates directly to the boiler, and for keeping the combustion chamber hot. They were made with boilers of the same kind, and practically the same proportions, but in different parts of the world, by different experimenters, and at different rates of evaporation, caused chiefly by the different steam requirements of the establishments in which they were situated.

At the bottom of Table I, I have placed the best recorded results obtained from anthracite coal by Johnson's, Meigs's, the "Little Giant" and Babcock & Wilcox boilers, as a standard for comparison with the bituminous coals. The following table shows the relative value of the several bituminous coals therein named, as tested by each of the boilers, the best results being selected out of those given in Table I, and the figures for anthracite being taken at 100 per cent:

RELATIVE STEAMING VALUES OF BITUMINOUS COALS. ANTHRACITE = 100.

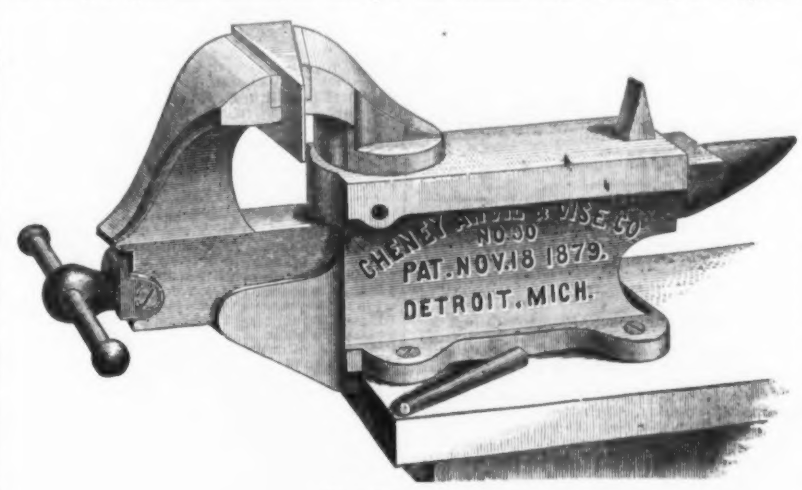
Coals.	Johnson's boiler.	Gen. Meigs' boiler.	Little Giant boiler.	Babcock & Wilcox boiler.
Newcastle, Eng..	84.5	81.1	59.0	.....
Welsh	....	....	....	109.6
Scotch	67.8	81.2	60.7	109.5
Cambria Co., Pa., semi-bit.......	90.1	....	....	91.2
Somerset Co., Pa., semi-bit...	90.1	105.1	97.2	.....
Cumberland, Md. semi-bit........	97.5	....	96.8	.....
Pittsburgh, Pa...	80.0	96.8	76.2	99.5
Ohio	....	....	64.8	84.9
Vancouver's Island	....	81.0	68.5	85.7

From the above table it will be seen that by all of the tests of the semi-bituminous coals their value, as compared with anthracite, varies only from 90.1 to 105.1 per cent., confirming what has already been said, that these coals give excellent results under a great variety of conditions. The value of the Scotch coals appears to vary between 60.7 and 109.5 per cent. of the value of anthracite, the same identical coal giving 60.7 per cent. in the "Little Giant" boiler, and 81.2 per cent., or more than one-third better, in General Meigs's boiler. The value of Pittsburgh coal is from 76.2 to 99.5 per cent. of the value of anthracite, the experiments of General Meigs with one coal giving the figures 76.2 and 96.8 per cent. The relative value of bituminous coal is therefore a variable quantity, dependent upon the conditions under which it is burned.

I hope the facts here imperfectly outlined may draw attention to the possibilities of obtaining better results from the highly bituminous coals of our Western States than are generally obtained in practice, or than those shown in the experiments here recorded. The whole subject of the proper methods of burning bituminous coals of various compositions needs to be reopened. It must be studied from the bottom, beginning with both proximate and ultimate analyses of the coals, and including scientific determinations of total heating power, as well as practical tests under steam boilers. The subject is of immense importance to the industries of the West and South. It would be well if the Government would undertake the series of accurate experiments necessary to lead to a solution of the problems involved, but if such experiments are to be conducted as imperfectly, and the results obtained so misleading as that reported by General Meigs, they had better be left to private enterprise.

Cheney's Combined Anvil and Vise.

The Cheney Anvil and Vise Co., 115 Ford street, East, Detroit, Mich., are manufacturing a combined anvil and vise with adjustable jaw, that has several features to commend it for general use. The face of the anvil is chill-hardened and the jaws are steel-faced, thus adapting it for such rough use as occurs in repair shops, about farms and in various other places where a very fine tool is not required. A horn is presented on the end of the anvil which is useful for various purposes, while a cutting edge is inserted at the back part of the plain surface, making it useful in various work of the character of amateur blacksmithing. This tool was devised to supply the want for a good but moderated-priced anvil and vise combined. It has been improved from time to time since it was first put upon the market, its strength increased and the castings made smoother, until it is now offered by the manufacturers with the conviction that it meets the requirements. A ledge has been added to the front of the vise, coming against the face of the bench in such a way as to relieve strain upon the fastening screws.



The Cheney Anvil.

INDUSTRIAL ITEMS.

MASSACHUSETTS.

The Fairhaven Iron Works, at Fairhaven, manufacture iron castings and make a specialty of their improved Fairhaven printing press, turning out a large number, which find ready sale in both home and foreign markets. The company also manufacture plate-rolling machines, for the use of silver-plate works, millwork, drop hammers, horseshoe vises and boiler castings. The works of the company are complete in all their appointments, cover about two acres of ground, and give constant employment to 75 hands. Much credit is due to the personal efforts of Mr. J. C. Tripp, treasurer of the company, who has had an experience of 16 years, and W. O. Lincoln, the present superintendent, for the high state of perfection which these goods have attained. Within a few days the Fairhaven Iron Works have received orders for 50 book-binding machines, 12 nail machines and three of their printing presses, and also from one of their customers for 180,000 pounds of castings.—*Boston Commercial Bulletin.*

The new hoe shop works at Northampton are to employ 400 hands.

The Co-operative Foundry Co., at Kingston, are about making an addition to their works.

The Edes, Mixter & Heald Zinc Co., of Plymouth, have recently opened valuable zinc mines in East Tennessee. The ore from these mines is found to be of very superior quality, being free from lead, arsenic and other impurities. An analysis made by Messrs. Ledoux & Ricketts, of New York, gave the following results: Iron, 0.017 per cent; zinc, 99.983 per cent, which indicates unusually pure zinc. The spelter made by this company is soft and ductile and of uniform quality, making it specially desirable for such work as cartridge brass, German silver, bronzes and the like. The mines and furnaces of the company are near Knoxville, Tenn., the sales office being at Plymouth.

CONNECTICUT.

The stock of the Frary Cutlery Co., Bridgeport, has been increased from $150,000 to $250,000.

The Howe Sewing Machine Co. talk of rebuilding, and will probably do so if Bridgeport people will subscribe, though no definite steps have been taken yet. The company want abated taxes amounting to about $42,000. A mortgage of $150,000 rests upon the property, besides a second mortgage of $750,000, for which bonds are floated.

The annual meeting of the Wilson Sewing Machine Co., Wallingford, resulted in the election of the old board of directors and the same officers, with the exception of the vice-presidency, to which office S. B. Kirby, well known to the sewing-machine trade, was elected. The matter of increasing the capital stock $200,000 was postponed for future action.

NEW YORK.

Work has been resumed in the merchant rolling mills at the Burden Iron Works, at Troy. All the Burden works will be in full operation next week.

PENNSYLVANIA.

The Howard Stove Co., of Beaver Falls, is a new concern. Mr. J. Eckl, formerly with A. J. Wolf, of Beaver, and later with J. Woodruff & Sons, of Salem, Ohio, is connected with the new company.

The Philadelphia and Reading Coal and Iron Co. will begin at once to manufacture rails 60 feet in length instead of 30 feet as heretofore. The rails will also be increased in weight from 68 to 70 pounds per yard. The decreased number of points to care for will lessen expenses. In referring to the reasons for this step, it was stated that the weight of a passenger car has been increased from 25,000 to 45,000 pounds, and that the parlor cars now used weigh 75,000. The weight of the freight and coal cars has been so far increased as to more than double their former carrying capacity, while the weights of locomotives have been increased in proportion. The company have arranged for the manufacture of a quantity of these 60-foot rails at once, and the best railroad experts in the country predict the most satisfactory results from them. An experiment was made in the rolling mill of the company for the purpose of testing the capacity of the mill to make long rails, which was entirely satisfactory.

Accounts are at hand of large outputs at two Pennsylvania furnaces. One of them, the Durham Furnace, at Riegelsville, yielded 101 tons of iron in one day in the latter part of July, while No. 1 Furnace of the Crane Iron Works, at Catasauqua, is recorded as having made a still larger yield. No. 1 is an 18-foot bosh furnace, and made 102 tons in 24 hours, and for one week her record was 535 tons of foundry iron, the average for several weeks being 500 tons. Durham Furnace, on the other hand, has a 20-foot bosh.

The pipe mill of the Reading Iron Works has shut down for repairs.

The Pennsylvania Electric Light Co., of Harrisburg, are now lighting the city and public grounds. They use the Fuller system of lighting, and the power is furnished by a Westinghouse engine of 100 horse-power. At a recent speed test made by the Fuller Co. the number of revolutions were found to be absolutely invariable. The test was made with a continuous recording speed indicator, and the resulting diagram was a straight line.

OHIO.

About one carload of wire fencing per day is present work of the Ohio Steel Barb Wire Fence Co., Cleveland, though when they are running double turn they put out 2½ carloads per day. Fifty men are employed.

The Sippo Valley Glass Works, Massillon, will start next Monday.

The assignment is announced of the Union Foundry Co., Silas Merchant, formerly president; N. F. Purcell, secretary. Assets and liabilities not stated.

The Woodruff Stove Co., of Salem, turn out an average of 45 stoves per day.

Newburgh Furnace, in Cleveland, which was purchased from the Newburgh Furnace Co. by the Union Rolling Mill Co., started up last week.

The old machine shop in Canal Fulton has been purchased by the Canton Tool Co., and put in repair, and is now getting under good headway. This shop has been idle for 10 or 12 years.

Tenders have, it is understood, been made by Cleveland, Brown & Co., of Cleveland, to rent the Russia mill at Niles of the assignees.

An additional battery of four boilers is being placed in the rolling mill of the Trumbull Iron Co., at Girard. Another engine has also been purchased.

Eight hundred sets of wagon irons constitute the daily output of the Cleveland Hardware Co. They are rolled directly from muck bar. About 140 men are employed.

ILLINOIS.

The Illinois Iron and Bolt Co., Carpentersville, Kane County, have recently erected an additional storehouse, 100 x 36, and are placing a considerable amount of new machinery in their works. They are just introducing to the trade a new patent steel skein for wagons, which has many points of excellence.

Messrs. H. B. Scutt & Co. will immediately commence the erection of a new factory (to be completed Oct. 1), 150 x 40 feet, for the manufacture of barbed fence wire. They will employ machinery of their own invention, and entirely different from any now being used.

Messrs. Shields & Brown, Chicago, manufacturers of Bradley's insulated air coverings, have just shipped an order for 3000 feet of the same to Boston, to be used in the public-school buildings there, and have also shipped a large order to Shreveport, La., and an order to the Omaha Linseed Oil Mills, Nebraska. They are just completing a large contract at the Elgin Watch Co.'s works, Elgin, Ill.

Messrs. C. H. Mitchell & Co., Chicago, manufacturers of elevators, report that they are unusually busy, considering the season, having orders on their books covering territory from New Hampshire to Texas and California.

R. T. Whelply, 131 and 133 Lake street, Chicago, as the Western agent of the Hamilton Rubber Co., has been awarded two bronze and one silver medal for best rubber belting, rubber hose and air-brake hose for railroad use, exhibited at the National Exposition of Railway Appliances.

The forging department of the Chicago Forge and Bolt Co.'s works, at South Chicago, is being enlarged by the erection of an additional building. This department is exceedingly busy, running day and night. To facilitate the shipment of their products, the company are now putting in new side tracks running on both sides of the works, connecting with the Pittsburgh, Ft. Wayne and Chicago and the Belt Line railroads. The company are also building 300 coal and stock bins, and have their hands full in every department.

The proprietors of the Union Drop Forge Works anticipate an early extension of their plant.

For the purpose of reorganizing the Union Iron and Steel Co., Mr. H. H. Porter, of this city, as before stated, proposes that a new company be formed to buy out the whole property of the present company, the capital stock of the new company to consist of a 7 per cent. cumulative preferred stock of $3,000,000, and a common stock of $1,600,000—total, $4,600,000—the preferred stock to be used in paying the indebtedness of this company, which amounts to $2,821,266.96, at par. If the second mortgage bondholders (and holders of the greater part thereof have already expressed their willingness to do so) will take preferred stock at par for their bonds, and the holders of the bills and accounts payable will take preferred stock at par for their notes and claims, the representatives of the "Stone indebtedness" (which is included in the figures given above) will buy the first mortgage bonds at par, and will take preferred stock for them. This new corporation will represent and own the Union Iron and Steel Co.'s plant, at Chicago; the Union Iron Mine, on the Menominee Range, subject to its royalty contract of 50 cents per ton; about 5700 acres of land on the Menominee iron range (Michigan); interest in patent of Bessemer Steel Co., Limited; cash and working supplies to run the steel works, of a value of from $675,000 to $750,000; any surplus of preferred stock not required in paying the indebtedness; some doubtful accounts, on which it is claimed that $100,000 at least should be collected. The fair cash value of all the personal property of the company, if used in running the works, is estimated at from $850,000 to $1,000,000, in addition to the plant itself. This plan seems a feasible and practicable one, and is probably the most profitable way out of the present difficulty. If accepted, the mill will be put in shape to be started at the earliest possible date.—*Chicago Industrial World.*

MISSOURI.

The Beck & Corbett Iron Co. have increased their capital stock from $130,000 to $160,000. The Wrought-Iron Range Co. have shut down their new works on Washington avenue for a few days. The St. Louis Saw Works are running full handed and turning out large numbers of saws, the demand for which is reported very good. The St. Louis Stamping Co. are now running all departments of their works. The Diamond Anti-friction Metal Co. are running nights on orders for brasswork.—*St. Louis Age of Steel.*

The Chouteau, Harrison & Valle Iron Co. have as yet come to no understanding regarding the starting up of their Laclede mills.

MICHIGAN.

The Lake Superior mines report a product of 2648 tons of copper for June.

WEST VIRGINIA.

It is stated that the Benwood Iron Works contemplate the construction of a second blast furnace.

The Exportation of American Stoves.

During the past year we have heard very little about the exportation of American stoves to foreign markets, beyond occasional notices that one house or another had made a shipment to some distant part. It has been generally understood, however, that there was more or less exporting going on in a quiet way, and for the information of our readers we have taken the trouble to look into the matter. From the New York Custom House records we have collected and tabulated statistics relating to the export trade in stoves during the past three and one-half years. These figures show a steadily increasing business, embracing all countries, from the most civilized to those just emerging from semi-barbarism. The value of the stoves exported during the first six months of the present year exceeds by more than $5000 the total amount for the year 1880, and is more than one-half the amount for 1882. As the first half of the year represents only between one-third and one-quarter of the annual export, the total for the present year will be far in excess of the total for last year. To illustrate this, Germany received $6629 worth of stoves in 1880, $12,520 worth in 1881, $7486 worth in 1882, and $3282 worth for the first six months of the present year. The comparative smallness of the last amount is only apparent, as the bulk of the trade is done during the last five months of the year, as the following figures will show: For the first six months of 1880 the amount shipped to Germany was $2586; for the same period in 1881 the amount was $2850, and for 1882 it was $1986, so that the $3282, representing the trade for the first six months of 1883, is indicative of a healthy increase in the yearly aggregate. The Argentine Republic, Brazil, British Possessions in Africa and Australasia, Chili, England and Mexico show this characteristic in a marked degree, while the other countries change but little from quarter to quarter. All of them are subject to fluctuations, as when England received $13,240 worth in April, 1882, and none during June and July.

In all of the countries which show a yearly trade of over $3000 the business may be said to be established, but in those dealing in smaller amounts it is, to a great extent, still experimental. For instance, Liberia received $300 in stoves in 1880, $56 in 1881, $115 in 1882, and none so far this year. The French West Indies were sent $566 worth in 1880, $147 worth in 1881, $579 in 1882; Gibraltar, $176 worth in 1881; Turkey in Asia, $127 worth in 1882; Russia on the Black Sea, $200 in 1882, but none of these has received any since. The market became overstocked or else the trade was not profitable. The following countries received no stoves from this port during 1880: British Guiana, Denmark, Dutch East and West Indies, Hawaiian Islands, Nova Scotia, Peru, Portugal, San Domingo, Spanish Possessions in Africa and Uruguay. Of these Uruguay has shown the most rapid growth, the value in 1881 being $423; in 1882, $347, and to June 30, this year, $3309.

The following table will be of interest, as it shows the value of the monthly and yearly export of stoves from the port of New York from January 1, 1880, to June 30, 1883:

Months.	1880.	1881.	1882.	1883.
January	$2,420	$3,246	$6,067	$8,506
February	2,791	4,260	6,531	9,710
March	6,503	7,290	6,829	16,047
April	6,365	2,621	20,150	11,497
May	6,262	8,762	3,968	11,150
June	3,654	7,034	7,689	13,023
July	4,704	5 658	6,756	....
August	8,213	10,799	10,824	....
September	6,154	9,013	14,426	....
October	3,933	14,043	16,094	....
November	8,072	10,078	6,668	....
December	5,535	12,106	11,235	....
Total	$64,626	$90,976	$117,237	$69,933

The following table shows the countries to which stoves were exported from New York, and the values, for the six months ending June 30, 1883:

Argentine Republic	$1,903
Belgium	273
Brazil	3,303
British Guiana	108
" Possessions in Australasia	9,066
" " Africa	3,581
" West Indies	3,747
Central American States	607
Chili	3,715
China	6,650
Cuba	832
Danish West Indies	79
Denmark	27
Dutch East Indies	173
" West Indies	49
England	12,397
France	330
Germany	3,282
Hawaiian Islands	3,105
Hayti	196
Honduras	79
Italy	75
Japan	492
Mexico	3,086
Miquelon	5
Netherlands	2,665
Newfoundland	154
Nova Scotia	66
Peru	518
Porto Rico	95
Portugal	1,157
San Domingo	112
Scotland	290
Spain	105
Spanish Possessions in Africa	97
United States of Colombia	3,652
Uruguay	3,309
Venezuela	284

We have always supposed that there was a considerable export of stoves from Philadelphia, but investigation shows that this was a mistake. About the time of the Centennial an attempt was made to do an export trade, and a few lots were sent by Chas Noble & Co. to Norway and Sweden. Cox, Whiteman & Cox also sent 100 wood stoves to Asia Minor, and 30 of another kind to Bermuda. Jas. Spear sent some to Paris in 1878, but in no case has it developed into a regular trade. The exports vary in value from $800 to $2000 per annum. Last year they were $1000 to Belgium, $50 to Cuba and $450 to England. We suppose they were sent from stove works outside of Philadelphia, as none of the concerns in the city have done anything in this line since 1879. The point to which they were shipped may not have been their ultimate destination. There is a line of steamers from Philadelphia to Belgium, and freight by them is as likely to be for Sweden, or Russia, or Austria, as for Belgium.

The exports of stoves from the whole United States for the year ending June 30, 1880, amounted to $91,473. For the year ending June 30, 1881, the value was $117,356, and for the year ending June 30, 1882, $184,408. The report for the fiscal year ending June 30, 1883, has not yet been compiled, but judging by the exports for the quarter ending March 31, 1883, which amounted to $54,517, a large increase in the business may be expected. The first quarter of the present calendar year was greater by $15,933, than the same quarter of the previous year. During the first three months of 1883, the value of stoves sent from New York was much more than half that of all the stoves sent from the United States during the first three months of the preceding year.

The following table shows the exports of stoves from the United States by customs districts for the year ending June 30, 1882:

Baltimore, Md	$122
Boston and Charlestown, Mass	29,654
Buffalo Creek, N. Y	845
Cape Vincent, N. Y	337
Corpus Christi, Tex	2,487
Cuyahoga, Ohio	10
Detroit, Mich	2,222
Galveston, Tex	55
Minneapolis, Minn	1,768
New Bedford, Mass	111
New Orleans, La	1,067
New York, N. Y	112,971
Passamaquoddy, Me	1,341
Philadelphia, Pa	793
Puget Sound, Wash. T	480
Richmond, Va	20
Saluria, Tex	176
San Francisco, Cal	29,755
St. John's, Fla	13
St. Mark's Fla	45
Vermont, Vt	114
Total	$184,408

A member of one of the largest stove firms in this city, and one which does a large portion of the exporting, said that they made no special stove for the foreign trade. "Stoves like all these," he said, pointing to his salesroom, where were displayed a full line of cooking and heating stoves, "may now be found for sale in China and other countries. Some countries will order one stove and nothing more will be heard from it for months, when a large order comes

in. The climate decides the kind of stove, the West .nd as, for instance, having no use for heating stoves, deals only in those for cooking. A climate like our own takes all. "Yankee manufactures can best be sold by Yankee salesmen," continued the speaker, in reply to the question how to best introduce such goods, "and the drummer, for that is what he is, must thoroughly understand the business. Is is like other trades. If a new sewing machine is put on the market and people are left in ignorance as to its merits and how to run it, it will fail, although it may be a superior article. We have had failures just from this cause—people didn't know how to run the stove, would not take time to study it, but would condemn it forthwith. The trade must be talked up understandingly. When once it has a footing, the American stove holds its own against all comers. I believe I could take a trip around the world and do a big business selling stoves." The probable cause of the great amount of exporting done from San Francisco is that the dealers there buy from Eastern makers and sell to representatives of houses in China, Japan and the Hawaiian Islands.

According to the latest indications, Eastern Germany is likely to receive her entire supplies of oil from the Caucasus. The present price of this oil in Breslau, including the entrance duty, is already 8 per cent. of the value lower than American petroleum, and the quality of the oil offered by the refinery in Noble, Baku, is said to be not inferior to the American.

Special Notices.

RECENT BOOKS.

Croes.—Statistical Tables from the History and Statistics of American Water Works. By J. J. R. Croes; 113 pages, 8vo, paper; 1883. . . $1

This is a pamphlet, compiled from special returns, giving such information as was attainable of 820 cities, towns and villages having a public water supply. It gives name of town, State, and number of population in 1880, date of construction, by whom owned, source of supply, mode of supply, builders of machinery, cost of works, bonded debt, rate of interest, offices of works, yearly expenses and receipts, daily consumption in gallons, miles of pipes, sizes of pipe, number of taps, daily consumption per tap, number of meters and fire hydrants, annual price per hydrant, kind of pipe in mains, and services.

Pocket Logarithms.—139 pages, 16mo, boards; 1883 . . . . . $0.50

A handy book for field work. The logarithms are carried to four places of decimals, including logarithms of numbers and logarithmic sines and tangents to single minutes. There is also a table of natural sines, tangents and co-tangents.

Flynn.—Hydraulic Tables—For the Calculation of the Discharge Through Sewers, Pipes and Conduits. Based on Kutter's Formula. By P. J. Flynn, C. E.; 135 pages, 16mo, boards; 1883 . . . . $0.50

Thompson. — Dynamo-Electric Machinery. By Prof. Sylvanus P. Thompson; with an introduction and notes by Frank L. Pope and Howard R. Butler; 57 illustrations, 218 pages, boards; 1883 . . $0.50

This little book consists of a series of lectures reprinted from the *Journal of the Society of Arts.* The forms in which the dynamo-electric machine has appeared have become so numerous as to defy all satisfactory classification. Professor Thompson in these lectures has arranged the various types by systematic grouping, so that any machine, while exhibiting peculiar characteristics, may be referred to its proper class.

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One Horizontal Engine, 12 in. x 16 in.
One Horizontal Engine, 8 in. x 24 in.
One Horizontal Engine, 9 in. x 16 in.
One Horizontal Engine, 8 in. x 16 in.
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One Engine Lathe, 17 in. x 6 ft. Pond.
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1 Screw-cutting Gap Lathe, 26 in swing over bed, 45 in. swing over gap; bed 24 ft. long. New.
1 each Engine Lathes 26 in. swing, 10 ft., 12 ft., 14 ft., 16 ft., 20 ft., 24 ft. bed. New.
1 Engine Lathe, 23 in. swing, 16 ft. bed. 2d hand.
1 each Engine Lathes, 21 in. swing, 6 ft., 8 ft., 10 ft., 12 ft. bed. New
1 each Engine Lathes, 20 in. swing, 6 ft., 8 ft., 10 ft., 12 ft. bed. New.
1 Engine Lathe, 20 in. swing, 8 ft. bed. 2d hand
1 each Engine Lathes, 19 in. swing, 7 ft., 8 ft., 10 ft. bed. New.
4 Engine Lathes, 19 in. swing, 6 ft. bed. Nearly new
1 " " 18 " " 6 " " New.
1 each Engine Lathes, 17 in. swing, 6 ft., 7 ft., 8 ft., 10 ft. bed. New.
1 Engine Lathe, 16 in. x 7 ft. bed. 2d hand.
1 Engine Lathe, 15 in. swing, 9 ft. bed. 2d hand.
2 " " 15 " " 6 " " New.
1 " " 14 " " 6 " " 2d hand.
1 " " 13 " " 6 " " New.
3 " " 13 " " 5 " " "
1 " " 12 " " 5 " " "
1 " " 11 " " 5 " " "
1 " " 10 " " 4 " " "
2 Hand Lathes, 15 in. x 5 ft. bed. New.
2 " 12 in. x 4 ft. bed. 2d hand.
1 " 12 in. x 4½ ft. bed. New.
1 " 12 in. x 4 ft. bed. New.
1 " 11½ in. x 4 ft. bed. New.
1 " 10 in. x 3½ bed. 2d hand.
1 " 10 in. x 3 ft. New.
6 " 10½ in. sw., 3 x 4 ft. bed. 2d hd
5 Single Head Lathes, 13 " 4 ft. " "
1 Bench Lathe, 8½ in. x 3 ft. bed. New.
1 Foot Lathe, 8½ in. x 3 ft bed. New.
1 Foot Lathe, 12 in. x 4 ft. bed. New.
1 Foot Lathe, 8 in. x 3 ft. bed. Back-geared.
1 Foot Lathe 8 in. x 2 ft. 8 in. bed. New.
1 Turret Lathe. 2d hand. 16 in. x 5 ft. bed. With Chuck.
1 Axle Lathe. New.
1 Planer to plane 31 in. x 30 in. x 6 ft. 2d hand.
1 Planer to plane 34 in. x 32 in. x 12 ft. 2d hand.
1 Planer to plane 27 in. x 27 in. x 7 ft. New.
1 Planer to plane 24 in. x 24 in. x 8 ft. New.
1 Planer to plane 24 in. x 24 in. x 6 ft. New.
1 Planer to plane 24 in. x 24 in. x 5 ft. New.
1 Planer to plane 22 in. x 22 in. x 5 ft. New.
1 Planer to plane 20 in. x 20 in. x 4 ft. New.
1 Planer 20 in. x 4½ ft. 2d hand.
2 Planers to plane 16 in. x 16 in. x 3 ft. New.
3 Crank Planers. New.
2 Shapers, 15-in. stroke, 23-in. traverse. New.
1 Shaper, 8 in. stroke. New.
1 Shaper, 6 in. stroke. New.
1 Shaper, 12-in. stroke, 33-in. traverse. New.
1 Shaper, 12-in. stroke, 18-in. traverse. New.
2 Shaping Machines, 7-in. stroke. 2d hand.
1 Back-geared Milling Machine. New.
1 Milling Machine, with Arm. New.
1 Lincoln Miller. New.
1 Hand Milling Machine. New.
1 Miller and Screw Slotter, combined.
1 Double Face Miller. New.
1 Automatic Milling Machine. New.
1 40-in. Radial Drill. New.
1 48 in. " " "
1 42-in. swing Upright Drill, B. G. & S. F. New.
3 24-inch Up. Drills, Bk. Gr. and Self Feed. New.
1 20-inch Lever Feed Upright Drill. New.
1 20-inch Lever and Wheel Feed Upright Drill. New.
1 Sensitive Drill. New.
1 Pratt & Whitney 4-Spindle Drill. 2d hand.
1 4-Spindle Drill Press. New.
1 3 " " " "
1 2 " " " "
2 Gang or Multiple Drills, 3 and 6 spindles. 2d hand.
1 Single Spindle Light Drill, Table Feed. New.
1 Single Spindle Profiler. New.
1 Two " " Light. New.
2 Profilers. 2d hand.
2 Turret Head Chucking Machines. 2d hand.
1 No. 1 Screw Machine, wire feed. 2d hand.
1 No. 2 Screw Machine, wire feed. New.
1 Screw Machine. New. Not wire feed.
1 " Slotter. "
1 Cutter Grinder. "
6 Emery Grinders. New.
1 Slitting or Circular Shear. New.
2 Tapping Machines.
1 12-in. Slotting Machine, 50-in. swing. New.
1 8-in. " " 30-in. swing. New.
1 Hydraulic Wheel Press for 72-in. Wheels. New.
1 13 ft. Bending Rolls. 2d hand.
1 Squaring Shear, 22 in. New.
3 Hand Shears. 2d hand.
3 Power Presses. New.
1 Foot Press. New.
1 Screw Press. New.
1 Drop Press. New.
1 Drop Press, 50 lb. Hammer. 2d hand.
1 Lot Heavy Polishing Frames. 2d hand.
2 Shafting Straighteners. New.
1 8 x 8 Upright Engine. New.
1 10 x 12 Horizontal Stationary Engine. New.
1 9½ x 12 in. Horizontal Stationary Engine. New.
1 5 in. x 6 in. Horizontal Stationary Engine. New.
1 5 x 12 Horizontal Stationary Engine. 2d hand.
1 10 H. P. Cylinder Boiler. 2d hand.
1 10 H. P. Upright Boiler. New.
1 10 H. P. Upright Boiler. 2d hand.
1 No. 1 Steam Pump. 2d hand.
2 Grindstones and Frames. New.

Wood-Working Machinery.

1 Saw Table. New.
1 Double Saw Bench. New.
1 24-in. Surfacer Rotary Bed. New.
1 Band Sawing Machine. New.
1 Scroll " " "
1 Rod Machine, Self Feed "
1 Sandpapering Machine. 2d hand.
1 8-in. Molder, 4 sides. 2d hand.
1 Edge Molding Machine. 2d hand.
1 Daniels Planer. 2d hand.
1 Large Lot 2d-hand Pulleys and Hangers.
And lot of others, both new and 2d hand.

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49 DEY STREET, New York City.

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HARDWARE AND STOVE

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Little Rock, Ark.

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FEB. 21, 1883.

1 Engine Lathe, 14 in. x 5, 6, 7 and 8 ft. Grant & Bogert.
1 " " 26 in. x 12 ft., Grant & Bogert. New.
1 " " 45 in. x 15 ft. Good order.
1 " " 36 in. x 12 17 ft. New.
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1 " " 14 in. x 6 ft. Star Tool Co. New.
1 " " 10 in. x 6 ft. New.
1 " " 14 in. x 5 x 6 ft. New.
1 " " 16 in. x 7 ft. Bridgeport. New.
1 " " 13 in. x 5 ft. and 6 ft. Ames. New
1 " " 16 in. x 6, 7 and 8 ft. Ames. New.
1 " " 18 in. x 8 and 10 ft. Lodge & Barker. New
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1 " " 22 in. x 12 ft. New.
1 " " 20 in. x 10 ft. New.
1 " " 28 in. x 16 ft. New.
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1 " " 11 in. x 4 ft. and 5 ft. Prentiss. New
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1 Plain Engine Lathe, 16 in. x 4 ft. New.
1 " " " 15 in. x 4 ft. New.
1 Fox Lathe, 15 in. x 5 ft. Am. Tool & Machine Co.
1 15 in. x 4 ft. Turret Lathe. Lodge & Barker.
1 Fox Turret Lathe, 16 in. x 6 ft. Lodge & Barker. New
1 Planer, 50 in. x 50 in. x 17 ft. Good order.
1 " 32 in. x 32 in. x 7 ft. Good order.
1 " 16 in. x 16 in. x 3 ft. New.
1 " 22 in. x 20 in. x 5 ft. New.
1 " 24 in. x 24 in. x 6 ft. Hendey. New
1 " 26 in. x 26 in. x 7 ft. New.
1 16 in. Lever Table Drill. New.
1 Crank Planer, 16 in. x 16 in. x 13 in. New.
1 16-in. Upright Drill. New.
1 20-in. " Prentiss. New.
1 24-in. " Prentiss. New.
1 20 in. " Prentiss. New.
1 25-in. swing B. G. & S. F. Drill. Blaisdell. New
1 28-in. " " " "
1 38 in. swing. B. G. & T. F. Drill. New.
1 15-in. Shaper. Gould & Eberhardt. New.
1 10-in. Shaper. Gould & Eberhardt. New.
1 15-in Shaper. Hendey. New.
1 24 in. Shaper. Hendey. New.
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Full Assortment of Milling Machines, Spindle Drills, &c., of Garvin's. New. [& Lamson.
1 each Nos. 2 and 4 Screw Machines, Wire Feed. Jones
2 No. 2 Lincoln Millers. Good order.
2 No. 2 Lincoln Millers. New.
1 Hand Lathe, 12 x 4, 5 and 6 ft. New.
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1 Boring and Turning Mill, 50 in. New.
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GARDNER BROS.,
Lockport, Pa.

For Sale.

Established in 1864. Gardner Bros.' Gas Retort and Fire Brick Works, situated at Lockport Station, on P. R. R., 60 miles from Pittsburgh, Pa. The works consist of complete plant for manufacturing Clay Gas Retorts, Settings, Blocks, Tile and Fire Brick. Capacity, about 100 retorts, with necessary settings, and 100,000 fire brick per month. Clay and coal mined by ourselves within short distance of works and hauled in wagons. Over three acres of land, with all necessary buildings, a number of tenements and town lots. P. R. R. has side track alongside our kilns. Good trade established. Our good will and influence to go with sale. Statement of business done will be shown to responsible parties desirous of purchasing. Any further information desired will be cheerfully given by
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Lockport, Pa.

For Sale.

The most prosperous Hardware, Stove and Implement business in Indiana; established ten years; in the "peerless little city" of Frankfort, Ind.; has 5000 inhabitants; surrounding country rich; four railroads and plenty of free gravel roads. Will sell stock alone and rent building, or sell both. Building is 130 x 30 feet, brick, iron and stone; has three floors, 130 x 30 ft., and one 90 x 30. Building has gas and water works of its own. Will sell for cash, or give good time for acceptable paper. Reasons for selling: Firm have manufacturing and other outside interests that demand their attention. Call on, or address,
MARVIN, BOOHER & PRICE, Proprietors,
Frankfort, Indiana.

For Sale.

The Industrial Works of Shamokin, owned and successfully carried on for a number of years by the late Wm. Brown, deceased, consisting of Foundry and Machine Shop, and a large stock of Patterns regarded as part of the property. Boiler Shop, Blacksmith Shop and Factory for the manufacture of heavy coal screens. Well located in the borough of Shamokin, Pa., with the best facilities for shipping by rail, and surrounded by a district contributing all the work that a shop of that kind can possibly turn out. Easy terms of payment are offered to suit a purchaser of limited capital. For list of Tools and further particulars apply to
WM. McILVAIN & SONS,
Manufacturers of Boiler Plate and Tank Iron,
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A Four-Cylinder Steeple Compound Engine of late design, of 100 nominal H. P. Large enough for 500-ton Hull. Address
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For Sale.

One Granulator, with attachments.
One large Mixer, with attachments.
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Two Sugar Packers.
The above is a portion of the Machinery formerly used at Baltimore Steam Sugar Refinery, Baltimore, Md. For information apply to
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One 600 lb. Davy Bros.' Steam Hammer; one 1500 lb. Morgan, Williams & Co.'s Double Stand'rd Steam Hammer; one Heavy Wood Frame Trip Hammer; one 60 H.-P. Side Feed Cut-off Engine; two 60 H.-P. Tubular Boilers, with No. 4½ Deane Steam Pump and all connections, Mud Drums, &c. Have not been used to exceed 90 days—practically new. Also a general assortment of new and second-hand Engines, Boilers and Machinery. Cheap for Cash.
M. F. PERRY,
43 South Canal Street, Chicago, Ill.

Trade Report.

BRITISH IRON AND METAL MARKETS.

[*Special Cable Dispatch to The Iron Age.*]

LONDON, WEDNESDAY, Aug. 15, 1883.

Scotch Pig.—The market is not so steady, and prices on some brands are lower. We quote makers' prices as follows:

Coltness,	alongside,	Glasgow	61/
Langloan,	"	"	60/
Gartsherrie,	"	"	56/
Summerlee,	"	"	56/
Carnbroe,	"	"	55/
Glengarnock,	"	Ardrossan	55/
Eglinton,	"	"	48/6
Dalmellington,	"	"	49/
Shotts,	"	at Leith	50/

Lighterage from Ardrossan to Glasgow is 1/ ℔ ton.

Cleveland Pig.—The market is unsteady. We quote as follows, f.o.b. shipping ports:

Middlesboro' No. 1 Foundry	43/6
" No. 2 "	41/6
" No. 3 "	39/ @ 39/6
" No. 4 Forge	38/

Bessemer Pig.—The market is without change to note, ruling weak. W. C. Hematites are quoted unchanged at 49/ @ 50/ for mixed lots, Nos. 1, 2 and 3, equal parts, f.o.b. shipping ports.

Blooms.—Nothing doing.

Manufactured Iron.—The market is irregular. We quote at works:

	£	s.	d.		£	s.	d.
Staff. Ord. Marked Bars	7	10	0	@	...		
" Medium "	6	5	0	@	6	15	0
" Common "	6	0	0	@	6	5	0
Hoops, 20 W. G. and over.							
" Common Best	7	0	0	@	7	5	0
" Medium	6	5	0	@	6	15	0
" Common	6	10	0	@	...		
Sheets, 20 W. G. and under.							
" Ordinary Best	8	15	0	@	9	5	0
" Common	8	0	0	@	8	5	0
Welsh Bars	5	5	0	@	5	7	6

Steel Rails.—The market is very unsettled, and quotations are difficult to give. The quotations for Ordinary Sections, as near as can be given under the present state of the market, are £4. 5/ @ £4. 15/. It is reported that 80,000 tons Steel Rails have been sold for Indian account at 80/ a ton.

Iron Rails—Dull and nominal. Welsh, 30 ℔. and upward, are quoted, nominally, £4. 15/ @ £5. 10/, f.o.b. shipping ports.

Old Rails.—The market continues unsettled. We quote Old D. H.'s, £3. 12/6 @ £3. 17/6, c.i.f. New York.

Scrap.—The market is irregular. Heavy Wrought is quoted £3. 5/ @ £3. 7/6, c.i.f. New York. Bessemer Crop Ends are quoted 60/ for run of the mill, f.o.b. shipping ports.

Copper.—The market is quiet and prices are unchanged. We quote Best Selected, £69 @ £70, and Chili Bars, £63. 5/ @ £63. 15/.

Tin—The market is weaker and values continue to decline. Straits, Ingot, spot, is quoted £92. 15/ @ £93. 5/, and futures, £93. 5/ @ £93. 10/.

Tin Plates—Are unchanged. We quote:

Tin Plates, 10 x 14,	1st qual.	Charcoal		19/6 @ 21/6
" "	2d	"	"	18/6 @ 19/
" "	1st	"	Coke	17/6 @ 18/
" "	2d	"	"	16/6 @ 17/

Spelter.—The market is a little weaker. Ordinary is quoted £15 @ £15. 2/6 at shipping ports.

Lead—Is lower. Common English Pig is quoted £12. 12/10 @ £12. 15/.

Freights.—Steam from Glasgow to New York, 5/ @ 6/; Liverpool to New York, 4/ @ 5/; Liverpool to Philadelphia, 5/ @ 6/6, and London to New York, 7/6 @ 9/6.

TRADE AND FINANCE.

Office of *The Iron Age*,
WEDNESDAY EVENING, August 15, 1883.

The striking event of the week is the "slump" in Wall street stocks, carrying consternation into the ranks of the professional operators. Two jobbing concerns have already gone under, one of them, that of G. W. Ballou & Co., to the amount of $500,000 to $750,000. The commercial world, notwithstanding, moves on comparatively undisturbed. One of the best-informed men in banking circles and one no less familiar with the Stock Exchange, was heard to remark: "The situation now is in no respect like that which preceded the panic of 1873. The people who make up the general public are out of the market and have been out of it for the last two years. This present depression, I think, may be regarded as but the natural outcome of the long period of liquidation. Things are settling down to a firmer basis. There is no cause for alarm. The prospects look bright throughout the country and business will undoubtedly assume a healthy condition." A representative of *The Iron Age*, after a talk with several well-known bankers, more especially those who discount largely for the mercantile classes, found that the views here quoted were universally approved. So, too, at the mercantile agencies. The banks of the country, as a whole, are sound; those in New York City have a large reserve and their business is good. Outside banks which have suffered embarrassment are in every instance identified in some way with local speculations. Merchants generally are likewise in good shape, so far as they have kept aloof from speculative enterprises. They are discounting their bills receivable, which represent solid merchandise and actual transactions, instead of making paper. These bills are the very best kind of collateral, and are accepted as such without hesitation. "This," said a gray-haired bank president, "is the old-fashioned, solid way," to which we are now returning. Further inquiry to-day among merchants shows that they are in nowise affected by the turmoil of Wall street, excepting that they are observing the utmost circumspection in all business arrangements; nobody wants to accumulate indebtedness or buy in advance of present needs.

The quietness in mercantile circles is reflected in the aggregate bank clearings of 24 leading cities, which show a decrease for the week of more than 25 %, compared with last year. Outside of New York there is a slight gain, the improvement being especially noticeable in Pittsburgh, Memphis and several manufacturing cities which in the previous week reported a loss. Interruption of the telegraphic service is no doubt partly accountable. There were 168 failures in the United States reported to *Bradstreet's* during the past week—13 more than in the preceding week, 73 more than in the same week in 1882, and 62 more than in the same week in 1881.

On the Stock Exchange the week has been unusually stirring. On Friday the sluggish course of speculation noticed for a long time back began to change, and on Saturday there was a largely increased volume of business. There had been a partial recovery from the depression caused by the failures in the Eastern States, when an announcement came of the failure of the First National Bank of Indianapolis, accompanied by many disquieting rumors. Stocks began to drop, and on Monday, as on previous days, Oregon and Transcontinental led the decline—during three days falling from 72 to 59. Northern Pacific also dropped heavily, but the Vanderbilt and coal stocks came out in pretty good shape. Owing to the unsettled and feverish state of affairs, several banks either called in their loans or materially shortened their lines of accommodation. Excitement was increased when it became known that a leading operator, lately known as a bull, had withdrawn his support. The Southwesterns, as a consequence, rapidly declined, and the Western Union was more or less affected by the cutting of its wires, as alleged, by disaffected operators. The small stock house of Cecil, Ward & Co. failed, and others were said to be embarrassed. Mr. Villard took pains to denounce as "wholly false" certain statements reflecting upon the Villard syndicate. On Tuesday there was a sharp rally in prices, followed almost immediately by the failure of Geo. W. Ballou & Co. This firm evidently expected a panic, and so had been selling short, but the market suddenly rose and caught them napping. According to a veteran stock broker, the whole movement was a reaction from the excessive speculation of three and four years ago. Although prices are not so low as in some former years, the current quotations are widely at variance with those of 1881 and 1882.

The following are the prices of some of the principal securities a day or two ago, as compared with the corresponding days in 1881 and 1882:

	1881.	1882.	1883.
C., C., C. and I.	22⅛	—	60
Chesapeake and Ohio	28⅜	25	14
Central Pacific	93⅜	93⅞	62½
Del., Lack. and West	124⅜	143⅝	120
Erie	43⅝	40	18½
Illinois Central	137⅛	138	125
Kansas and Texas	43⅛	39¼	21⅛
Louisville and Nashville	102	75⅜	45
Michigan Central	97⅛	100	82½
Missouri Pacific	107⅛	106½	93½
New York Central	144	136⅛	113½
Northwest	125¾	145⅜	120
Northern Pacific	41⅛	50½	39⅝
Oregon and Trans	—	91	59
Pacific Mail	50⅝	41¾	28½
Rock Island	—	138¼	117½
St. Paul	114	123⅛	98⅞
Omaha	41¼	50¼	36¼
Texas Pacific	56⅛	51⅜	25
Wabash	57⅛	36¼	15½
Western Union	89¼	88½	75½

To-day the stock market was irregular, due in part to the failure of E. C. Stedman & Co., members of the Exchange, but the result of the day's business was a general advance, ranging from ½¢ to 3¾¢. The Western Union and the Villards were the features, the former very weak, while the Vanderbilts and coal stocks were strong and well sustained. It is rumored that a strong combination, in which Mr. Gould, Mr. Sage, Mr. Villard, Mr. Morgan, Mr. Woerishoffer and Mr. H. N. Smith figure prominently, has been formed to sustain the market. Altogether, the feeling is buoyant.

The announcement is made to-day that the capital of the Postal Telegraph Company has been fixed at $21,000,000, of which $19,000,000 has been issued to be sold, and that of this last amount to be offered for sale $12,000,000 has been placed in the hands of George S. Coe, President of the American Exchange National Bank. A working capital is said to have been raised by the sale of $3,000,000 of first mortgage bonds (on the present and future property of the company) to J. W. Mackey, H. L. Horton and Geo. D. Roberts.

The money market is more active, causing an advance in the rate for call loans, ranging as high as 6 %. Quotations are 5½ @ 6 % for 60 to 90 days' indorsed bills receivable, and 6 @ 6½ % for four-months' acceptances. The banks are in a strong position, well prepared for the usual autumn demand from the South and West, when the crops mature. Already the rates of domestic exchange are less favorable to this center. The bank statement showed slight changes in the different averages, but, taken altogether, was a favorable exhibit. The loans were contracted $220,000, while the banks gained $461,700 specie, also $87,300 in surplus reserve, so that they now hold $9,333,655 in excess of the 25 % legal requirements. Compared with last year, they hold $6,273,100 more cash, and have $10,315,100 less loans outstanding. Sterling exchange is weaker, having been twice reduced. The posted rates now stand $4.84 for 60-day and $4.87½ for sight, and the indications favor a resumption of gold imports in case the rates for money

harden in this market, or should the export movement from this side materially augment.

The imports of foreign merchandise at the port during the past week were somewhat below the usual average, the total being $7,460,645, of which $4,830,500 represent general merchandise, and the remainder dry goods. Since January 1 the imports aggregate $285,731,817, compared with $312,758,321 for the corresponding period of 1882. The imports of specie amounted to $153,746, and the exports for the same time $249,460. The exports of domestic produce from this port were quite moderate, the total being $6,558,077, against $7,779,934 for the same week last year. There was a fair movement of most of the leading items—provisions, petroleum and breadstuffs. Since January 1 the exports amount to $216,832,079, compared with $204,096,283 for the corresponding period of 1883. The exports of breadstuffs from the seven Atlantic ports for the week to August 4 show a considerable increase over the preceding week. The aggregate is, however, below the amount at the corresponding time last year.

The following were the closing quotations for Government bonds:

	Bid.	Asked.
U. S. 4½, 1891, registered	111⅞	112
U. S. 4½, 1891, coupon	112⅝	113
U. S. 4, 1907, registered	118⅝	119
U. S. 4, 1907, coupon	118⅞	119
U. S. 3 per cents	103	103¾
U. S. Currency 6s, 1895	128	—
U. S. Currency 6s, 1896	129	—
U. S. Currency 6s, 1897	130	—
U. S. Currency 6s, 1898	131	—
U. S. Currency 6s, 1899	133	—

MINING STOCKS.

The following were the closing quotations for mining stocks:

	Bid.	Asked.
Amie	...	16
Alta Mont	5	6
Belle Isle	...	40
Bodie	35	45
B., H. & E., n	...	⅝
Bulwer	72	80
Bull Domingo	...	6
Barcelona	35	...
Caled. B. H.	70	90
California	35	...
Climax	9	...
Con. Imp.	3	7
Con. Va.	58	63
Crysolite	1.10	...
Central Arizona	14	...
Cherokee	1	...
Dahlonega	2	4
Durango	...	10
Dunkin	...	28
Decatur	...	3
Eureka Con	6.50	...
East Or	93	...
Elko Con	11	...
Father de Smet	3.60	...
G. Prize	27	35
Green Mountain	...	75
Gold Stripe	...	9
Horn Silver	6⅛	6¼
Hortense	7	...
Independence	30	...
Iron Silver	...	3.10
Leadville Con	15	...
L. Pittsburg	60	...
L. Chief	38	45
Mexican	...	3.50
Navajo	...	3.00
N. Belle	6⅛	...
Ontario	...	32
Ori. & Mil	...	14
Pine Line cer	1.03¾	1.10
Rappahannock	6	7
Robinson Con	63	66
Red Elephant	5	8
Sierra Nev	4.50	4.75
Standard	5⅛	...
Silver King	6.00	...
Sutro Tun	19	20
Sierra Gr	1.00	...
Sonora Con	25	27
Union Con	5⅜	...
Unadilla	...	5

GENERAL HARDWARE.

There is a general complaint that business is not as brisk as it should be for the season, though there are some sections of the country from which we hear a better report. The feeling that the fall trade is likely to prove a disappointment is much more generally expressed than was the case a few weeks ago.

The demand for Nails is exceptionally strong for the season, and there are no signs of an early abatement. The price is still firm at $3 for ordinary orders, from which price a small concession can be had for large lots.

Sargent & Co., agents for L. S. Watson & Co., and Graham & Haines, agents for Howard Brothers, issue, under date of the 13th inst., the following revised price lists for Hand Cards, showing an advance in Cotton Cards, the remainder of the list being unchanged. The discount on these goods is 10 per cent.:

PRICE LIST OF L. S. WATSON & CO.

Cotton Cards. Per doz. pairs.

No. 10, Extra A A, Original Whittemore, A 1, Plantation, 10⅜ x 4⅜ ... $5.00
No. 10, A, Successors, Widow Whittemore, 10⅜ x 4⅜ ... 4.75
No. 10, Whittemore (Small No. 10), 10⅜ x 4⅜ ... 4.50

The above list constitutes all the qualities and sizes now made. Cotton cards are packed in 1 or 2 dozen pair cases. No charge for cases.

Wool, Tow, Mixing and Jim Crow Cards. Per dozen pairs.

No. 8, A Wool ... 8⅝ x 4⅜ $2.70
" 8, B " ... 9⅝ x 4⅜ 2.50
" 5, " Canada size ... 8⅝ x 4⅜ 3.00
" 9, " ... 9⅝ x 5⅜ 3.00
Tow Cards, No. 22 Wire ... 9⅝ x 4⅜ 3.80
Mixing Cards ... 9⅝ x 4⅜ 3.00
Jim Crow Cards, per single dozen, in boxes of 2 dozen each ... .75

Wool, Tow and Mixing Cards are packed in 1 or 2 dozen pair cases. No charge for cases.

Leather Horse Cards. Per single doz.

No. 1, Large Horse Cards ... $0.90
" 3, small " ... .85
" formerly called Curry Cards ... .80
No. 4, Small Horse Cards ... .75

Large Horse Cards are packed in cases of 8 single dozen each.
Small Horse Cards are packed in cases of 12 single dozen each.
In cases of smaller size than above, add 5 cents per dozen to list.

PRICE LIST OF HOWARD BROTHERS.

Cotton Hand Cards Per doz. pairs.

No. 10, XXX, Warranted, Whittemore's, 10⅜ x 4⅜ inch ... $5.00
No. 10, XX, Whittemore's, 10⅜ x 4⅜ inch ... 4.75
No. 10, Whittemore's (small size) 10⅜ x 4⅜ in ... 4.50

The above constitute all the qualities and sizes now made.

Wool Hand Cards.

No. 8, XX, 9⅞ x 4⅜ inch ... $2.70
No. 8, X, 9⅞ x 4⅜ inch ... 2.50
No. 5, Canada, 8⅝ x 4⅜ inch ... 3.00
No. 9, Canada, extra large, 9 x 5⅜ inch ... 3.00
Tow Cards, extra strong, No. 22 Wire, 9⅞ x 4⅜ inch ... 3.00
No. 7, Best Mixing, No. 24 Wire, 9⅞ x 4⅜ in ... 3.80
Jim Crow Cards, 2 doz. in a case, per single doz. ... 0.75

Cotton and Wool Cards packed 1 and 2 dozen pairs in a case.

Horse and Curry Cards.

Horse Cards packed 8 single dozen in a case.
Curry Cards packed 12 single dozen in a case.
In cases of smaller sizes than above, add 5 cents per dozen to list. Per single doz.

Horse Cards, XX, Coppered Wire, 8¾ x 4 inch ... $0.90
Horse Cards, X, Coppered Wire, 8¾ x 5 inch ... .85
Curry Cards, XX, Coppered Wire, 5¾ x 4 inch ... .80
Curry Cards, X, Coppered Wire, 5¾ x 4 inch ... .75

The Board of Trustees of the Excelsior Savings Bank, Sixth avenue and 26th street, on the 25th of July, elected Mr. George C. Waldo, of the firm of E. L. Post & Co., manufacturers of drug oils, president of the bank, in place of R. W. Hazard, resigned.

The following announcements will explain themselves:

PLYMOUTH, MASS, Aug. 1, 1883.

To the Trade: We have this day given the agency of our full line of Manufactured Tacks, Trunk and Clout Nails, Shoe Tacks and Nails, to Messrs. W. H. Quinn & Co., of No. 99 Chambers street, New York, who will represent us in the States of New York, Pennsylvania, New Jersey and Delaware, and are hereby authorized to quote our lowest factory prices. Our facilities for manufacturing are such that we are now able to supply any demands that may be made upon us by the trade. Price lists and discount sheets will be furnished by them on application. Soliciting for them a fair share of your orders, we remain,

Yours truly,
PLYMOUTH MILLS,
WM. P. STODDARD, Treas.

To the Jobbing Trade: Having appointed Messrs. Chamberlain, Coxe & Miller (office, 89 Lake street, Chicago) as our direct representatives (on salary) for the sale of our productions in the territory embraced in the cities of Buffalo and Pittsburgh, thence west and north of the Ohio River, we solicit through them a continuance of the courtesies and favors we have heretofore received from you, with assurances that they will be at all times prepared to quote our bottom prices to the jobbing trade.

LAWRENCE CURRY COMB CO.

IRON.

American Pig.—There are no new features to report, the transactions of the past week having been mainly of a retail character. There is very little apprehension concerning the future either among sellers or buyers. There is no incentive to buyers to lay in heavy stocks in advance of actual needs, nor is there any apparent cause for sellers to force Iron on the market at concessions. The present condition of affairs seems to be very satisfactory for the season. Meanwhile the indications are that stocks at the furnaces are slowly decreasing, as the Metal Exchange now has statistics to that effect from 126 furnaces, which produce more than one-fourth of the Pig Iron made in the United States. On the 1st of July these furnaces had 99,058 tons on hand, while on the 1st of August they had reduced their stock to 91,740 tons. There are not wanting other indications of the good condition of the Pig Iron branch of the trade, one of which is that present prices seem to be acceptable, and there is less "shopping" now done than was the case a short time back. We continue to quote No. 1 Foundry $22 @ $23, but favorite brands command $23.50. Foundry No. 2 is in such good supply that it can be had at from $20 to $21, with occasional concessions. Gray Forge is not in as strong request as Foundry Irons, and can be had at various prices, according to brand, say, from $18.50 to $20, although it is claimed that some sales have been made at even lower figures.

Scotch Pig.—A moderate business has been done, and dealers report the condition of the trade quite satisfactory. Steadiness and strength are the main characteristics. About 2500 tons were received at this port during the past week, all of which had been sold to arrive. There has therefore been no accumulation in the spot supply. We quote Eglinton, $21 @ $21.50; Carnbroe, $22.50 @ $23; Coltness, $24; Shotts, $24; Glengarnock, $23; Gartsherrie, $24; Langloan, $24; Summerlee, $23 @ $23.25; Carron, $23. These prices may be affected very shortly by the disturbed condition of labor in Scotland, as it is reported by mail and cable that the coal miners there are determined to have their share of the recent advance in the price of Coal, which may precipitate a strike or a lockout, and thus curtail the production of Scotch Pig Iron.

English Pig.—It is understood that a considerable quantity of Bessemer Pig, amounting to perhaps 5000 tons, has been sold at $21 @ $21.25, for shipment. Although this price is regarded as very low—in fact, from 50 cents to $1 under the present cost of importation—there are some consumers of Bessemer Pig who would hesitate to offer over $20.50 for English Pig, inasmuch as they assert they can shade that price on this side of the Atlantic.

Steel Rails.—The makers are very firm, being full of orders for near-by delivery. They quote $38 @ $39 at mill, and are indifferent about orders for the future at these prices, which barely cover cost at the present price of material and rate of wages paid.

Manufactured Iron.—There is a fairly satisfactory feeling in several divisions of this branch of the Iron trade, notably among the dealers in Structural Material and Plate and Sheet Iron. Some symptoms of a better trade have even manifested themselves among the dealers in Bar Iron, although generally there is much complaint that trade is very dull. Bar Iron is quoted from store at $2.30 @ $2.40 for Refined, and $2.10 @ $2.20 for Common.

Old Rails.—The firmness noted last week continues, and higher prices have been realized for the small quantities of Old Rails which are available. We quote $22.50 @ $24.

Wrought Scrap.—There is not a strong demand, but at the same time there is some business being done. Some Selected Scrap has been sold at $25. A lot of 300 tons from yard was sold at $24, and 500 tons were sold on private terms for shipment. Quotations are $23.50 @ $25.

NEW YORK METAL EXCHANGE.

The following sales have been reported during the week:

THURSDAY, August 9.

25 tons Straits Tin, Aug. del ... 21⅛¢
50 " " " July-Aug. ship ... 21 1-10¢
25 " " " August " ... 21⅛¢

FRIDAY, August 10.

No transactions.

SATURDAY, August 11.

No sales.

MONDAY, August 13.

25 tons Straits Tin, Aug.-Sept. ship ... 20⅞

TUESDAY, August 14.

25 tons Straits Tin, Aug.-Sept. ship ... 20 8-10¢
10 " Billiton Tin, Aug. del ... 21⅛¢
25 " Straits " ... 21¢
25 " " " Second half Oct ... 21¢
50 " " " Aug.-Sept. ship ... 20¾¢

METALS.

Copper.—The market has been quiet; little Copper is offered and little wanted. Sales of all kinds have been confined to 150,000 lbs at 15⅛¢ @ 15¼¢ for Lake Superior, and 14¢ @ 14½¢ for other brands. London has been easier the past few days, Best Selected coming £68 and Chili Bars £64. Cable news from Chili is to the effect that the Chilean victory of July 10 over Caceres has hastened pacification; that a Government is fast organizing in Peru, and that, not unlikely, after the conclusion of a treaty of peace, the army of occupation may be withdrawn three months from now. This will restore to the Copper mines in Chili a full force of miners, and production may take its wonted development. That this prospect cannot be a pleasing one to the speculators in London in Chili Bars is evident. We are cabled from London to-day as under: "Market quiet and prices unchanged. Best Selected, £69 @ £70, and Chili Bars, £63. 5/ @ £63. 15/." The world's Copper production last year is estimated at 171,612 tons, against 158,931 in 1881, 148,901 in 1880, and 147,656 in 1879. Messrs. James Lewis & Son, Liverpool, Aug. 1, say: "Without any very active trade demand or pressure to sell, Copper has remained very steady during the past month. Chili Bars sold on the 2d ult. at £63. 17/6, sharp cash, and £64, usual 14 days, the demand being chiefly for Spot Copper. A considerable quantity offered by an importer sold at £63. 15/, usual 14 days, and subsequently £63. 10/ was accepted. Values then improved, but have since fluctuated between £63. 10/ and £64 for Spot, and £64. 5/ @ £64. 15/ for three months' prompt, the closing quotations being £63. 10/, Spot, and £64. 5/, three months. In addition to about 1800 tons of Chili Bars of Lota brand, to arrive, sold on private terms, 600 tons of Australian Wallaroo sold on the 11th inst. at £68 10/ ℔ ton, and about 800 tons of Australian Ingot, cake and slab of various brands, at equivalent prices, according to quality. Smelters and manufacturers appear to be purchasing only for their immediate requirements, and are understood to hold very limited stocks, while latterly there has been more inquiry for Manufactured Copper." Manufactures may be quoted as under: Bottoms, 24¢; Braziers, 24¢; Sheathing, 22¢, and Bolt Copper, '24¢.

Tin.—Has been only moderately active and rather weaker, in view of the lower quotations per cable from London of £93 @ £93. 10/, Straits, and £94. 10/, cost and freight from Singapore. Shipments from the Straits, August 1 to August 15, have been 450 tons this way, and 150 tons to England. We receive the ensuing cablegram from London to-day: "Market weaker, and values continue to decline. Straits, spot, quoted £92. 15/ @ £93. 5/, and futures, £93. 5/ @ £93. 10/." The market here has settled down to 21¢ @ 21⅛¢, with Straits Tin. *Tin Plates.*—There has been during the week a good jobbing demand, and prices have remained steady, except of Coke Tin, which is a little lower, in sympathy with Liverpool. The latter quotes Coke 16/, and Charcoal 18/6 @ 20/, while London cables to our address that there is no change. We quote at the close, large lines, ordinary brands, ℔ box: Charcoal Bright, $5.70 @ $6.12½; do. Ternes, $5.15 @ $5.35; Coke Tin, $5.05 @ $5.15, and do. Ternes, $4.80 @ $4.90.

Lead.—Some 200 to 400 tons Common Domestic sold at 4¼¢, and 100 tons Refined at the same figure, with more offering of the latter at the same price. St. Louis is dull at $3.90, Hard, and 4¢ Soft. From London we receive to-day the following cable message: "Market lower. Common English Pig, £12. 10/ @ £12. 15/. "Manufactures are quoted as follows: Lead Pipe, 6¼¢; Sheet Lead, 7¼¢; Tin-lined Lead Pipe, 15¢ ℔ lb, and Block-tin Pipe, 45¢, less the usual discount to dealers.

Spelter and Zinc.—The only Spelter still to be had at the low figure of 4⅜¢ is a popular brand; others are held higher, and cannot be had under 4⅝¢, as a better demand seems to be springing up for galvanizing purposes. Silesian is worth 5⅛¢. We quote Bertha Refined, 7¼¢, Bergenport, 9½¢. *Sheet Zinc* active at $5.90 @ $6. From London we receive the following dispatch: "Market a little weaker. Ordinary quoted £15 @ £15. 2/6 at shipping ports."

Antimony.—Has been quiet at 9⅜¢ for Hallett and 10⅜ @ 10½¢ for Cookson.

COAL.

The Anthracite Coal trade is in good shape for the season. On Tuesday the Pennsylvania Coal Co. advanced their prices 10¢ on Egg, 20¢ on Stove, and 15¢ on Chestnut, as follows:

Lump, per ton, delivered in Newburgh ... $3.95
Steamer, " " " ... 3.93
Grate, " " " ... 3.90
Egg, per ton, delivered in Newburgh ... 4.10
Stove, " " " ... 4.40
Chestnut, " " " ... 4.40
Pea, " " " ... 2.90

Other companies are expected to make advances soon, to correspond. Special Coals now bring pretty near the circular rates, but "outside Coals," as the remark goes, "are way off." Business, it is believed, will improve from this time to the close of the year, and the mines will be worked on full time. The Western demand is steadily increasing. Bituminous Coal is quoted about $4 alongside.

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the week ending August 14, 1883.

	Quan.	Val.
Danish West Indies.		
Sew. ma., cse.	1	$48
Nails, bxs.	4	36
Mf. iron, pkgs	21	168
Clocks, cs.	2	51
Ptlm., gals.	766	97
Bremen.		
Ptlm., gals.	803,364	59,460
Hdw., pkgs.	2	97
Ag.imp.,pgs.	362	3,200
Rotterdam.		
Hdw., pkgs.	32	650
Copper, bars.	589	4,601
Wringers, cs.	2	69
Copper, cks.	65	16,087
Pumps, pkgs.	19	924
Scales, cs.	10	545
Amsterdam.		
Mach'y, pkgs.	4	919
Mf. iron, pkgs	6	189
Copenhagen.		
Hdw., cs.	30	480
Gottenburg.		
Ptlm., gals.	218,753	18,010
Hamburg.		
Ag.imp., pkge	1	112
Clocks, pkgs.	12	260
Sew. ma., cs.	368	7,607
Copper, bbl.	1	174
Mf. iron, pkge	1	26
Saws, cs.	2	103
Arms, case	1	131
Knit ma., cs.	8	975
Nails, bxs	16	198
Nails, kegs	56	109
Brass kettles.	3	116
Revolvers, cs.	5	2,642
Ptg. press, cs.	3	330
Hdw., pkgs.	51	858
Mach'y, pkgs.	13	1,790
Cop. g'ds, cs.	4	241
Tacks, cs.	4	83
Mule shoes, kegs	40	240
Scales, cs.	14	158
Christiania		
Hdw., cs.	27	481
Russoer.		
Ptlm., gals.	124,927	9,300
Antwerp		
Ptm., gls.	1,270,964	99,650
Saws, pkgs.	3	35
Bullets, cs.	4	35
Mf. iron, pkgs	8	76
Sew. ma., cs.	51	1,200
Hdw., pkgs.	3	51
Rifles, case	1	165
Mach'y, pkgs.	6	400
Elsinore.		
Ptlm., gals.	174,462	12,960
Dantzic.		
Ptlm., gals.	302,500	24,200
Glasgow		
Windmill	1	70
Hdw., cs.	8	209
Ag. imp.,pkgs	7	379
Sew. ma., cs.	556	8,272
Mf. iron, pkgs	25	211
Cartridges, cs	2	60
Clocks, pkgs.	7	232
Pumps, pkgs.	3	132
Liverpool.		
Mach'y, pkgs.	9	908
Hdw., pkgs.	127	3,646
Clocks, cs.	195	6,315
Door springs, cs.	20	500
Ptlm. gals.	835,880	70,150
Cutlery, case.	1	70
Zinc dross, hhds	22	330
Clocks, case.	1	50
Copper, casks	90	15,120
Brass, cks.	4	950
Guns, cs.	30	597
Cop. ore, bgs.	1804	10,000
London.		
Mach'y, pkgs.	19	4,535
Hdw., pkgs.	71	3,649
Scales, cs.	7	4,100
Plumb'rs' materials, pkgs	3	62
Stmpdwre, cs.	6	225
Cutlery, case.	1	375
Mf. iron, pkge	1	30
Saws, cs.	3	344
Ptlm., gals.	577,342	51,40
Bristol.		
Ptlm., gals.	298,993	23,945
Newcastle.		
Mach'y, pkge.	1	150
Hull.		
Mach'y, pkgs.	13	786
Shears, cs.	2	55
Clocks, pkgs.	13	290
Sew. ma., cs.	1003	8,880
Hdw., pkgs.	20	618
Ag. imp., pkgs.	4	173
Mf. iron, pkge	1	12
Wringers, cs.	2	74
Pumps, pkgs.	7	212
Canada.		
Mach'y, pkgs.	16	1,695
Antimony, cks	12	684
Newfoundland.		
Hdw., case	1	25
Mf. iron, pkgs	10	113
Mach'y, pkgs.	10	327
Vigo.		
Ptlm., gals.	60,000	5,437
British West Indies.		
Ptm., gals.	15,100	1,402
Hdw., pkgs.	27	374
Steel bars	7	58
Iron safe	1	70
Nails, kegs	33	136
Iron rails	230	435
Mf. iron, pkgs	27	385
Sew. ma., cs.	11	198
Firearms, cse.	1	86
New Brunswick.		
Ptlm., gals.	25,000	2,500
Iron ore, tons.	360	1,570
New Zealand.		
Mach'y, pkgs.	2	212
British East Indies.		
Ptlm., gals.	250,000	25,000
British Australia.		
Saws, cs.	8	331
Pumps, pkgs.	23	785
Ptlm., gals.	115,016	13,306
Clocks, pkgs.	187	4,190
S. rollers, cs.	3	105
Scales, cs.	30	671
Axles, cs.	5	188
Sew. ma., cs.	311	6,499
Wire g'ds, cs.	5	123
Turn table	1	4,000
Nails, kegs.	37	527
Iron safe	1	103
Trunks, pkgs.	37	341
Hdw., pkgs.	882	17,255
Wringers, cs.	16	277
Ag.imp., pkgs.	84	1,570
Mf. iron, pkgs	319	3,113
Water wheel	1	180
Nails, cs.	32	402
Nails, kegs	65	258
Cutlery, cs.	7	127
Guns, case	1	31
Mach'y, pkgs.	16	2,377
Tacks, cs.	19	473
W. mills, cs.	31	3,000
Havre.		
Mach'y, pkgs.	2	420
Copper, cks.	180	33,750
Sew. ma., cs.	135	3,500
Ag. imp., pkgs	10	669
Copper, bars.	381	15,800
Nova Scotia.		
Syphon	1	89
Hdw., cs.	2	246
British Guiana.		
Ptm., gals.	9600	1,000
Pumps, pkgs.	4	347
Scales, cs	30	130
Mach'y, pkgs.	61	1,080
Aden.		
Ptlm., gals.	141,060	13,400
Cuba.		
Mf. iron, pkgs	316	5,971
Mach'y, pkgs.	27	2,786
Spikes, kegs.	20	60
Scales	74	284
Nails, cs.	4	90
Sew. ma., cs.	34	611
Hdw., pkgs.	99	1,169
Brass g'ds, cse	1	25
Windmill	1	966
Iron, bdls.	16	65
Nails, kegs	182	335
Clocks	14	352
Cutlery, cs.	29	330
Dr. goods, cse	1	125
Porto Rico.		
Hdw., pkgs.	50	843
Scales, cs.	11	230
Cutlery, cs.	5	82
Iron, pkgs.	13	75
Nails, kegs.	4	50
Ptlm., gals.	19,625	2,003
Saw. ma., cs.	25	250
Mf iron, pkgs	30	317
Iron safes	2	240
Whls. & axles.	200	375
Ag.imp.,pkgs.	8	130
Argentine Republic.		
Ptlm., gals.	63,680	6,362
Hdw., pkgs.	94	1,851
Scales, pkgs.	91	1,410
Ag. imp, pkgs	300	10,163
Azores.		
Ptm., gals.	26,563	2,250
Brazil.		
Tacks, bxs.	102	897
Sew. ma., cs.	65	1,325
Clocks, case	1	20
Bells, cs.	2	61
Mach'y, pkgs.	22	1,690
Nails, pkgs.	30	97
Sinks, cs	4	111
Scales, case	1	18
Spikes, kegs.	11	79
Cartridges, cs	4	65
Shoe nails, bxs	25	108
Hdw., pkgs.	246	1,548
Nails, cs.	12	55
Cutlery, cs.	84	1,426
Ag. imp., pkgs	30	560
Steel screws, cs.	3	169
Pumps, pkgs.	8	314
Ptlm., gals.	67,200	6,050
Rifles, cs.	2	179
Mf. iron, pkgs.	26	355
Philippine Islands.		
Ptlm., gals.	231,000	22,050
Sandwich Islands.		
Locks, cs.	10	500
Tacks, cs.	6	240
Peru.		
Sew ma., cs.	30	500
Piærus.		
Ptlm, gals.	276,090	25,290
San Domingo.		
Nails, kegs	89	319
Mach'y, cs.	265	13,653
Tin plts., bxs.	8	76
Hdw., pkgs.	21	259
Ptlm., gals.	5930	618
Iron, pkgs.	26	284
Sugar mill	1	50,000
Sew. ma., cs.	12	109
Mf. iron, pkgs	22	422
Lead, pigs.	11	50
Cutlery, pkgs.	2	99
Cartridges, cs	20	400
Pumps	4	44
Carbines, cse.	1	140
Scales, cse.	1	18
Sht. zinc, case	1	28
Alicante		
Ptlm., gals.	189,052	16,141
Trieste.		
Ptlm., gals.	376,520	28,400
Pasages.		
Ptlm., gals.	83,530	6,160
Bilbao.		
Ptlm., gals.	115,500	10,600
Uruguay.		
Ptlm., gals.	72,000	6,680
Mf iron, pkgs.	45	529
Rifles, case	1	37
Mach'y, pkgs.	3	275
Cartridges, cs	14	200
Pumps, pkgs.	16	1,210
Clocks, pkgs.	16	608
Scales, cs.	4	112
Sew ma., cs.	47	748
Ag. imp., pkgs	637	18,193
Hdw., pkgs.	14	345
Nails, cs.	50	235
Cutlery, cs.	84	1,723
Chili.		
Clocks, cs.	16	312
Nails, kegs.	936	2,968
Mach'y, pkgs.	96	26,202
Saws, case	1	50
Hdw., pkgs.	140	3,311
Ag. imp., pkgs	62	5,720
Revolvers, cse	1	170
Ptlm., gals.	40,000	3,725
Sew. ma., cs.	242	4,432
Mf. iron, pkgs	24	476
Mexico.		
Ptlm., gals.	10,750	1,159
Hdw., pkgs.	32	1,142
Mach'y, pkgs.	54	3,055
Mf. iron, pkgs.	71	608
Cutlery, case.	1	41
Saws, case	1	42
W. closet	1	27
Iron, pkgs.	39	132
Per. caps, cs.	13	570
Sugar pans	4	165
Sew. ma., cs.	45	721
Yel. metal, cs.	7	444
Ag. imp., pkgs	2	90
Pumps, pkgs.	3	82
Cartridges, cs	5	248
Scales, cs.	7	119
Locomotives	3	32,465
Nails, kegs	239	974
Tacks, case	1	25
Clocks, cs.	3	196
Nails, cs.	20	70
Wh'ls & axles	473	7,897
Steel, bdls.	4	31
R.R. chairs	5000	717
Railroad cars.	105	27,698
Cadiz.		
Ptlm., gals.	32,000	2,800
United States of Colombia.		
Mf. iron, pkgs	140	1,919
Mach'y, pkgs.	144	5,050
Cutlery, cs.	20	684
Ptlm., gals.	5170	584
Scales, cs.	14	307
Firearms, cs.	20	2,180
Fire extinguishers	2	72
Pumps, pkgs.	8	171
Br. goods, cs.	2	205
Plumb. mat'ls, pkgs.	3	26
Ag. imp., pkgs	17	875
Q'silver, flsks.	4	117
Needles, case.	1	72
Hdw., pkgs.	182	2,088
Sew. ma., cs.	70	1,674
Cartridges, cs.	706	15,181
Nails, kegs.	10	40
M. castings, cse	1	250
French Possessions in Africa.		
Ptlm., gals.	143,136	12,730
French West Indies.		
Ptlm., gals.	5000	468
Clocks, pkgs.	3	29
French Guiana.		
Scales, cs.	2	30
Ptlm., gals.	1000	180
Japan.		
W. cloth, cs.	4	92
Locks, case	1	49
Mach'y, pkgs.	18	900
Hayti.		
Sew. ma., cse.	1	40

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending Aug. 15, 1883.

Hardware.

Am. Diamond Boring Co.
  Mach'y, cs., 4
Arctic Ice Mfg. Co.
  Mach'y, pkgs, 16
Blumenthal A. & S.
  Packages, 5
Borgfeldt & Co.
  Cases, 2
Belcher H. H.
  Files, case, 1
Baldwin Bros. & Co.
  Case, 1
Boker Hermann & Co.
  Hdw., cutlery and guns, pkgs., 121
Codd, Hiram & Co.
  Mach'y, cs., 3
Clark G. A. & Bro.
  Mach'y, cs., 3
Davies, Turner & Co.
  Packages, 4
De Young L. & Co.
  Mach'y, cs., 2
Drexel, Morgan & Co.
  Arms, cs., 52
Dunham, Buckley & Co.
  Case, 1
Dunlap R. & Co.
  Mach'y, pkgs., 5
Field Alfred & Co.
  Casks, 4
  Cases, 20
  Anvils, 111
Fairbanks & Co.
  Mach'y, case, 1
Folsom H. & D.
  Guns, cs., 11
Godfrey, C. J.
  Mdse., cs., 17
Graef Cutlery Co.
  Cutlery, cs., 10
Goldschmidt, Bacharach & Co.
  Machines, case, 1
Hammacher A. & Co.
  Case, 1
Hall, Nicoll & Co.
  Case, 1
Hensel, Bruckman & Co.
  Machine, 1
Hartley & Graham,
  Mdse., cs., 17
  Arms, cs., 6
Hoe R. & Co.
  Mdse., cs., 2
Johns H. W. Mfg. Co.
  Nails, kegs, 60
Judd H. L. & Co.
  Cases, 3
Kleeberg P.
  Mach'y, cs., 3
Merch. Disp. Trans. Co.
  Cases, 2
Moore's Sons J. P.
  Guns, cs., 51
Moss, F. W.
  Files, cks., 4
Noyes, Smith & Co.
  Cases, 2
Schoverling, Daly & Gales.
  Arms, cs., 19
  Cases, 21
Schulz & Buckgaber,
  Chains, cks., 18
Strasburger, Oscar & Co.
  Cases, 13
Struller, Lau & Co.
  Arms, cs., 5
Strauss, Blumenthal & Co.
  Cases, 4
Sussfeld, Lorsch & Co.
  Chains, cask, 1
Taylor Thos.
  Cases, 2
Veitt Bros.
  Cases, 2
Wallach A. & E.
  Cases, 8
Wiebusch, Hilger & Co.
  Hdw., cutlery and guns, pkgs., 39
Witte John G. & Bro.
  Cutlery, cs., 13
Order,
  Guns, cs., 16
  Files, cks., 8
  Cutlery, cks., 4
  Cask, 1

Iron.

Alexandre F. & Sons,
  Bars, 2377
Addie R. & Sons,
  Pig, tons, 700
Baring Bros. & Co.
  Rivet ends, coils, 1712
  Rail ends, 4479
  Bars, 12,185
  Pig, tons, 200
Bond, Parsons & Co.
  Pig, tons, 100
Baldwin Bros. & Co.
  Wire, case, 1
Brown Bros. & Co.
  Wire rods, coils, 6233
  Bars, 20
  Rivet rods, coils, 790
  Iron coils, 2737
Coddington T. B. & Co.
  Sheets, bdls., 841
Corson & Co.
  Pig, tons, 100
Crooks R. & Co.
  Pig, tons, 300
Crocker Bros.
  Spiegel, tons, 631
  Pig, tons, 250
Frasse & Co.
  Wire, cks., 3
Hammacher A. & Co.
  Wire, case, 1
  Wire, cks., 7
Hayward, Perry & Franklyn,
  Wire, case, 1
Ironclad Mfg. Co.
  Packages, 593
  Mach'y, pkgs., 10
Lillienburg N.
  Blooms, 350
Ladenberg, Thalmann & Co.
  Pig, tons, 200
Lee Jas. & Co.
  Pig, tons, 100
Lundberg Gust.
  Bars, 9767
  Pieces, 19
Meissner, Ackermann & Co.
  Rivet wire rods, coils, 2323
Mason J. W. & Co.
  Wire ropes, cs., 3
  Wire reels, 2
  Wire, coils, 2
McSorley J. A.
  Oxide, bbls., 24
McComb J. J.
  Cotton ties, bdls., 2482
Montgomery & Co.
  Wire, cks., 6
Naylor, Benzon & Co.
  Wire rods, coils, 478
Pierson & Co.
  Sheets, bdls., 1088
Saunders & Co.
  Pig, tons, 15
Stetson Geo. M. & Co.
  Pig, tons, 400
Seligman J. & W. & Co.
  Rails, 1603
The Scoville Mfg. Co.
  Black taggers, bxs., 10
The Electric Supply Co.
  Gal wire, coils, 134
Williamson Jas. & Co.
  Pig, tons, 100
Wood, Niebuhr & Co.
  Wire rods, bdls, 152
  Wire rods, pkgs., 421
Order,
  Pig, tons, 2424
  Ore, tons, 2015
  Sheets, bdls., 417
  Wire, coils, 260
  Ferromanganese, cks., 86
  Wire rods, bdls., 3620
  Coils, 1092
  Bars, 3210
  Rods, bdls., 437
  Cotton ties, bdls., 3300
  Rods, coils, 25

Steel.

Abbott, Jere & Co.
  Cases, 25
Belcher H. H.
  Cases, 2
  Ingots, 45
Cary & Moen,
  Casks, 28
Gennert G.
  Steelware, case, 1
Hammacher A. & Co.
  Wire, cs., 14
Hoe Henry,
  Pins, case, 1
Mayer, Strous & Co.
  Casks, 17
Merchants' Dispatch Co.
  Bands, 28
Moss F. W.
  Bundles, 327
  Bars, 68
Plock & Co.
  Tires, car wheel, 80
Temple & Lockwood,
  Bundles, 35
  Bars, 43
  Cases, 5
The Clark Mile-end Spool Co.
  Mach'y, pkgs., 109
Wagner W. F.
  Plates, 216
  Bundles, 160
  Bars, 118
  Cases, 47
Order,
  Bands, 69
  Bars, 49
  Spring steel, bdls., 10
  Packages, 28
  Bundles, 612
  Box, 1

Metals.

Agents Bank of Montreal.
  Tin plates, bxs., 1412
Am. Clock & Brass Co.
  Mdse., cs., 14
Archer & Pancoast,
  Mdse., case, 1
Barrow Geo.
  Lead, pigs, 17
Baring Bros. & Co.
  Tin plates bxs., 100
Bruce & Cook,
  Tin plates, bxs., 663
Clement L. M.
  Bronze scrap, bdls., 4
Cort N. L. & Co.
  Tin plates, bxs., 8335
Cuba Electric Co.
  Electric bells, 4
Dood David & Co.
  Clocks, cs., 11
Downing, Sheldon & Co.
  Therm'ters, case, 1
Dickerson, Van Dusen & Co.
  Tin plates, bxs., 261
Elwell Jas. W. & Co.
  Tierces, 2
  Brass, case, 1
Foote Emerson,
  Grain nickel, cs., 10
Gt. Western Disp. Co
  Terne plates, bxs., 425
Hibbard, Spencer & Bartlett,
  Tin plts., bxs., 2204
Levy C. M. Bros.
  Mercury, cs., 3
Low A. A. & Bros.
  Electroplate, cs., 3
Meyer G. A. & E.
  Zinc oxide, cks., 100
Phelps, Dodge & Co.
  Tin plates, bxs., 17,138
  Black taggers, bxs., 50
Rocker C.
  Metallic caps, cs., 19
Schoverling, Daly & Gales,
  Gun caps, cs., 5
Stone F. & G. M.
  Copper rollers, cs., 3
Thompson J.
  Zinc, pkgs., 2
Western Trans. Co.
  Tin plates, bxs., 1217
Winter & Smillie,
  Tin ingots, 750
Order,
  Tin plates, bxs., 2506
  Terne plts., bxs., 27
  Old type, half cks., 5
  Metal, cask, 1
  Tin taggers, bxs., 266
  Tin, cs., 64
  Tin, bxs., 125
  Tin, slabs, 4444
  Spelter, plates, 4141
  Zinc oxide, bbls., 100
  Antimony, cs., 10
  Tin, tons, 75
  Metallic caps, cs., 2

FOREIGN TRADE MOVEMENTS.

Included in the imports for the week ending August 10 were leading articles of merchandise valued as follows:

	Pkges.	Value.
Antimony	50	$2,782
Anvils	61	558
Bismuth	7	3,206
Brass goods	45	4,485
Bronzes	41	5,581
Clocks	33	3,192
Copper	...	7,388
Cutlery	146	50,014
Guns	107	23,227
Hardware	23	684
Iron, pig, tons	3,092	57,242
Iron, sheet, tons	44	3,712
Iron cotton ties	4,000	3,239
Iron, other, tons	587	23,792
Lead, pigs	159	600
Machinery	210	14,286
Metal goods	365	27,558
Nails	6	739
Needles	11	2,448
Nickel	2	803
Percussion caps	12	695
Pins	17	2,728
Platina	4	5,939
Saddlery	7	1,243
Steel	18,148	44,183
Tin, bxs	22,936	120,041
Tin, slabs, 5,031; lbs., 425,961	...	91,506
Wire	951	10,283
Zinc oxide	500	5,377

The quantity of hardware and metals imported compare with previous dates as follows:

	For the week.	32 weeks of 1883.	Same time 1882.
Cutlery, pkgs	146	4,840	4,556
Hardware, pkgs	14	816	725
Iron, R. R., bars	...	10,642	83,049
Lead, pigs	159	5,432	18,675
Steel, pkgs	18,148	2,249,708	1,244,600
Tin, bxs	22,936	1,206,574	1,417,660
Tin slabs, lb	425,961	11,849,681	10,867,059

PHILADELPHIA.

Office of *The Iron Age*, 220 South Fourth St., Philadelphia, Aug. 14, 1883.

Pig Iron.—The market has been exceedingly dull during the past ten days, and, while prices are nominally unchanged, a large proportion of the offerings can be had on easier terms than at the date named. Buyers are not anxious to place orders, however, so that transactions have been largely for carload lots, and from that to 50 to 100 tons. Those likely to require larger quantities expect lower prices, and, unless inducements are offered, they seem disposed to take their chances of the market later on. In some quarters we hear of firm quotations and an active demand, but this is not by any means general. It is difficult to find any absolutely correct data upon which to form opinions, but numerous indications point to a much smaller consumption than we had a year ago, so that, notwithstanding reduced production, prices are weak and irregular. From this condition of affairs it may be inferred that neither buyers nor sellers have any expectation of higher prices, while both appear to be afraid that present quotations will not be fully maintained. The important curtailment of production is the strongest feature in the market, and, if it is shown in the course of a few weeks that consumption is actually in excess of production, a further slight reaction may follow the depression which is now being experienced. In this respect it is impossible to determine what the position actually is. Some Irons are scarce, others are plenty, but, as a whole, the offerings seem to be a little in excess of the demand; hence weakness in prices. On the other hand, it is generally understood that consumers seldom, if ever, carried lighter stocks than at present, so that there is a possibility of the demand being unexpectedly heavy, irrespective of any general improvement in business, which, in fact, very few are looking for. Under these circumstances predictions as to the future cannot be made with any degree of certainty, and all that can be said in regard to the market is that it is dull and prices a shade easier, with a disposition on the part of consumers to take only small lots as required from time to time. No. 1 Foundry appears to be well sold up, and is scarce, although holders are not pushing for extreme quotations, as they were some time ago. Prices range from $21.50 to $23.50, delivered at tide, with the majority of sales at from $22 to $22.50, beyond that being for very favorite brands. No. 2 Foundry is dull and heavy at prices ranging from $19.50 to $21, although there is little doubt that important concessions could be had on large lots. Stocks of this Iron are very heavy, and sellers are seeking for offers with a good deal of urgency. Mill Irons have not fully maintained their position, and while some are firm on their quotations, others are inclined to weaken, without meeting any improvement in the demand. Sales have been made at prices varying from $18.50 to $20, delivered, $19 @ $19.50 being the usual figures for standard brands in lots of 50 to 100 tons each, very few caring to take larger quantities at present.

Bessemer Pig.—Notwithstanding the numerous inquiries and favorable prospects of a week ago, very little actual business has been done, because of the timidity of buyers. Sellers have been quoting $21 @ $21.50, according to port and date of shipment, but so far only one lot has been taken—5000 tons at $21, shipment New York. Offers of $20.50 have been made for large lots, but, according to the most recent advices from abroad, there is not much probability of sellers being able to shade $21.

Spiegeleisen.—Buyers refuse to follow the advance—$31.25 asked for 20 %, and $26.25 for 10 @ 12 %. A few hundred tons 20 % sold at over $31, but holders show symptoms of weakening, and on firm offers it is not at all improbable that last week's prices will be accepted—say, $30.50 @ $30.75 and $25.75 respectively.

Blooms.—Market dull and prices very irregular. The usual quotations are as follows: Charcoal Blooms, $57 @ $58; Run-out Anthracite, $47.50 @ $49; Scrap Blooms, $42 @ $44; Northern Ore Blooms, $39.50 @ $41.50.

Muck Bars.—Market rather quiet, but good Bars are steadily held at about $34 at mill, with a number of small sales at that quotation.

Bar Iron.—There is very little to report in this department, business being dull and unchanged. The demand is fair, but chiefly for small lots, and at somewhat unsatisfactory prices. There has been no change in quotations, and, on the whole, prices seem to be steadier, although still very irregular, according to quality, size of order, specification, &c. The offerings from outside mills seem to have fallen off, and it is likely that country mills have filled up with work from other sources, as they are not so urgent for business as they were a little while ago. At the same time, it is difficult to sell any but small lots at 2.2¢, and from that down to 2.1¢ is quoted, according to circumstances. Skelp Iron has been inquired for, and sales amounting to about 1000 tons have been made; prices supposed to have been 2.15¢, delivered.

Plate and Tank Iron.—The market is very quiet, scarcely any new business having been on the market for some time. The mills are all full of work however, so that there are no complaints of immediate dullness, although manufacturers would be glad to see business coming in for October and later deliveries. Prices are steady, and, as a rule, unchanged, but for such dates as above referred to it is not unlikely that concessions of a tenth or thereabouts would be made. Tank Iron seems to be neglected, but there is likely to be a steady consumption of Boat Plate, Bridge Plate, Flue Iron, &c., so that manufacturers are sanguine of finding a fairly active market during the balance of the year. We repeat last week's quotations as follows, viz.: Tank Iron, 2.5¢; Boat Plate, 2.35¢ @ 2.4¢; Shell, 3¢ @ 3.25¢; Flange, 4¢ @ 4.25¢, and Fire-Box, 5¢ @ 5.5¢.

Structural Iron.—There is but little change in this department, business generally being in a very satisfactory condition. We have not heard of anything specially important, but orders that have been in sight for several weeks have been definitely closed, so that there is probably more actual business on hand than there has been for some time. Prospects are considered entirely satisfactory for the fall trade, and there is every reason to expect that the mills will find full employment during the balance of the year. Prices are about as follows: Angles, 2.3¢ @ 2.4¢; Bridge Plates, 2.4¢ @ 2.5¢; Tees, 3¢, and Beams and Channels, 3.5¢.

Sheet Iron.—The demand for Thin Sheets continues to be very active, and stocks are rapidly melting away. Other descriptions are only in moderate demand, but manufacturers expect to utilize their full capacity during the next three or four months. Prices are steady, and for ordinary-sized lots may be quoted as follows, viz.:

Common Sheets, No. 28	4¾¢
Common Sheets, Nos. 26 and 27	4¼¢
Common Sheets, Nos. 21 to 25	4 ¢
Common Sheets, Nos. 18 to 20	3¾¢
Best Refined, ¼ ¢ advance on the above.	
Best Bloom Sheets, Nos. 26 to 28	6¾¢
Best Bloom Sheets, Nos. 22 to 25	6½¢
Best Bloom Sheets, Nos. 16 to 21	6¼¢
Common Red Plates, 3-16 to 16	3.2¢
Best Bloom, Galvanized, discount	45 %
Second quality, discount	55 %

Wrought-Iron Pipe.—There is a fair amount of business doing in a small way, but manufacturers complain that prices are at a figure which prevents them from urging business to any great extent. Boiler Tubes have been in better demand than for some months previous, at, say, 60 % off list price for retail lots, and 70 % off on Gas and Steam Pipe. On the larger sizes of Steam Pipe additional discounts could probably be had, but on the smaller sizes the above quotation is held with a fair degree of firmness.

Steel Rails.—The market continues in much the same condition as last reported, viz., active for fall deliveries; others dull and neglected. Buyers are still holding off under the impression that prices will be lower, $36 @ $36.50 being about their ideas of value, although manufacturers still quote $38. It is possible that firm offers at medium rates would be accepted, but in the meantime neither party seems inclined to move. Small lots for early delivery command $38.50 @ $39 at mill, at which rates a number of sales are reported.

Old Rails.—There are several buyers for Old T-Rails at about $22.50 @ $23, but there are no spot lots, and $23.50 is asked for shipments from the South. Double Heads are offered at $26, with a probability that firm offers of $25.50 would be accepted for good-sized lots.

Scrap Iron.—Market very quiet, but, as good qualities are scarce, holders are firm at about $24 @ $25 for carload lots.

Nails.—The market continues, on the whole, active, although in some few cases the demand is reported as not quite so urgent as it was a week or two ago. In ordinary transactions $3 appears to be the ruling quotation.

CHICAGO.

Office of *The Iron Age*, 36 and 38 Clark St., Cor. Lake St., Chicago, Aug. 13, 1883.

Hardware.—We have no change to note in the market for Shelf and Heavy Hardware; the demand, as a rule, continues good and prices firm.

Nails—Continue firm at $3.05 @ $3.15 ℔ keg for 10d to 60d., according to quantity.

Manufactured Iron.—Merchant Iron of all kinds is in good request, with fair stocks in dealers' hands; prices continue unchanged. We quote Bar, 2.15¢ @ 2.25¢ rates; Angle, 3¢ @ 3.2¢ rates; T Iron, 4¢ rates; Beams, 3.8¢; Channels, 4¢; Sheet Iron, 9 to 14 gauge, at 3¢ rates; 15 to 17 do., at 3.3¢; 18 to 21 do., at 3.6¢; 22 to 24 do., at 3.8¢; 25 to 26 do., 4¢; 27 do., 4.2¢. The quotations on Sheet Iron would be shaded 1-10¢ @ 2-10¢ ℔ lb on large lots. Norway Original Bars, 4¼¢ rates; Norway Rerolled Bars, 5¼¢ rates; Ulster, 4¼¢ rates; Low Moor Iron, 8¢ rates; Nuts and Washers, 8¾¢ off list; Wrought Boat Spikes, 2.9¢ rates.

Pig Iron.—While there is considerable inquiry, the recent advance in Lake Superior Charcoal Iron seems to have a tendency to check sales somewhat, and, aside from those made with the agricultural foundries, the bulk of the contracts are small. The demand for imported Iron is moderate, with a fair market. We quote Lake Superior Charcoal, Nos. 1 and 2, $24; No. 3, $25, and Nos. 4, 5 and 6, $26. Briar Hill, $24; Himrod, $22.50; Crane, No. 1, $25; No. 2, $24; Thomas, $23 @ $26.50; American Scotch, $22 @ $25; Du Val, No. 1, $23.50; No. 2, $22.50; Fulton Notch, No. 1, $22.50; No. 2, $21.50; Calumet (nominally), $22 @ $23; Southern Coke, No. 1, $23; No. 2, $21.50; Low Moor, No. 1, $24; No. 2, $22.75, 4 mos.; Silvery Soft $21 @ $23.50; Ashland (Hanging Rock Softener), No. 1, $23; No. 2, $22, 4 mos.; Scotch Imported, $27 @ $28.

Ores.—There seems to be somewhat more inquiry; otherwise we have no change to note. Menominee Range Hematites are offered at $3.50 @ $4, f.o.b. at Escanaba.

Steel.—There is a fair movement in the Steel market and quotations continue without change. We quote Tool, 11¢; Machinery O. H., 4½¢; Crucible Machinery, 7¢; Hammer, 2 inches and under, 8¢; over 2 inches, 9¢; Cast Spring, 5½¢, and O. H. Spring, Tire and Sleigh Shoe, 4¢; Sheet, first, second and third quality, 11¢ and 8½¢, respectively; Crucible Plow, 6¢; Eagle Plow, 4½¢; Iron Center Plow, 9¼¢, and Soft Steel Center Plow, 9¼¢; Cast Plow, 5¢; German Plow, 4½¢.

Scrap Iron.—The inquiry is considered moderately fair and quotations are slightly firmer. We quote makers' purchasing prices: No. 1 Country Wrought Scrap, ℔ net ton, $17; No. 1 Cast Scrap, ℔ ton, $15; No. 1 Stove Plate Scrap, ℔ ton, $10; Machine Shop Wrought Turnings, ℔ ton, $9; Cast Iron Borings, $7; Old Plows and Plow Steel, $11; Malleable Scrap, $5.

Scrap Metals.—A slight improvement is to be noted in this market, but quotations remain unchanged. We quote dealers' purchasing prices as follows: Heavy Brass, ℔ lb, 9¢; Light Brass, ℔ lb, 6¢; Heavy Copper, ℔ lb, 11¢; Copper Bottoms, ℔ lb, 10¢; New Copper Clip, ℔ lb, 11¢; Zinc, ℔ lb, 2½¢; Heavy Lead, ℔ lb, 3¢, and Tea Lead, ℔ lb, 2½¢.

Everett & Post, 156 Lake street, Chicago, report to us as follows, under date of August 11, 1883: *Pig Lead.*—There is but little change in Pig Lead to report. Some 400 tons have changed hands, mostly for shipment East. What little trade there is doing is of a hand-to-mouth order, buyers generally holding off for a steadier market. Prices nominally $4.05 for Common and Refined. *Connellsville Foundry Coke* is in better demand than for some time past, many large consumers being in the market to make contracts. Market strong and steady at $5.15, f.o.b. Chicago.

CHATTANOOGA.

Office of *The Iron Age*, Market and 8th Sts., Chattanooga, Aug. 13, 1883.

Business, in a general way, has perceptibly improved since the beginning of August. New manufacturing enterprises are being pushed forward in expectation of profitable business in the fall. Prices, though not perceptibly higher, are more solid, and there is less disposition to contract ahead by those who control heavy supplies and large industries. Elaborate improvements of many lines of Southern railway progress satisfactorily, and within two months two important lines—the New Orleans and Northeastern and the Vicksburg and Shreveport—will be opened for business. These lines belong to the Erlanger syndicate. They will materially shorten the distance between Gould's Texas system and the central North, and put Cincinnati in direct and quick connection with the latter and with New Orleans, over a route managed in the interest of that city. The drought mentioned in our last reports has given place to abundant showers over all the parched country, which was but a comparatively small section of the middle South. Late corn now promises a fair yield, and fall pasturage and root crops will be abundant. The weather for the week has been cool and bracing.

Pig Iron.—There is a better feeling in the market than has been perceptible for some weeks. Prices are fairly firm at quotations. Furnacemen decline contracts more than 30 days ahead at present prices. There is more disposition to buy. We quote: No. 1 Foundry, $19 @ $20; No. 2 Foundry, $18 @ $19; Gray Forge, $16 @ $19; White and Mottled, $14 @ $15; Car-wheel Metal, $24 @ $26.

Ores.—We quote 50 % Brown Hematite, ℔ ton, $2 @ $2.75; Red Fossil, $2 @ $2.25, delivered at furnace.

Miscellaneous Articles.—Old Rails are fairly firm at $22. We quote Wrought Scrap, $18 @ $22; Cast Scrap, $11 @ $14; Old Wheels, nominal, $22.

Nails.—The quotation remains at $3 for large bills, 60 days, 2 % off for cash; job lots, 10¢ @ 15¢ higher.

LOUISVILLE.

Geo. H. Hull & Co., Commission Merchants, report as follows, under date of Aug. 11, 1883: The market is quiet and sales light. Manufacturers are buying only what they need for immediate use. We quote for cash in round lots as below:

FOUNDRY IRONS.

No. 1 Hanging Rock Charcoal	$25.00 @ 25.50
No. 1 Southern Charcoal	22.50 @ 23.00
No. 1 Hanging Rock Stonecoal and Coke	20.50 @ 22.50
No. 1 Southern Stonecoal and Coke	20.00 @ 20.50
No. 2 " "	18.50 @ 19.50
"American Scotch"	19.00 @ 21.00
Open Silver-gray	18.00 @ 19.00
Close "	17.00 @ 18.00

MILL IRONS.

No. 1 Charcoal	19.00 @ 20.00
No. 1 Stonecoal and Coke, Neutral	17.75 @ 18.00
No. 2 " " "	16.75 @ 17.00
No. 1 " " Cold-short	17.50 @ 18.00
No. 2 " " "	16.75 @ 17.00
White and Mottled, Cold-short and Neutral	15.00 @ 16.00

CAR WHEEL IRONS.

Hanging Rock, Cold-blast	32.00 @ 33.00
" Warm-blast	24.00 @ 25.00
Alabama and Georgia, Warm and Cold-blast	27.00 @ 26.00
Central Kentucky, Cold-blast	25.00 @ 26.00

W. B. Belknap & Co., Iron and Steel Merchants, Nos. 115 to 121 West Main street, report to us as follows, under date of August 11: *Bar Iron* is firm under a steady demand. Were anything to interfere with continuous running of the mills, we should speedily be made aware of how large the demand really is. There is more sticking for quality. The all Old-Rail Iron is found unfit for general purposes and a better grade expected for Merchant Bar. *Hoops* and *Bands* still dull. The standard wagon sizes are in a little better request. *Sheet.*—The heavier sizes are going off fairly; the stove-pipe gauges are demoralized by the presence of large stocks on the market. This Iron is selling at from $25 to $30 ℔ ton lower than last year. *Nails* are quite scarce in the leading sizes. The demand for immediate shipment is quite urgent and the mills do well to start next Monday. *Wire.*—Plain Wire is a little steadier. Large buyers say their orders of two or three weeks since would not be accepted now. The season for Barb Wire is also opening up and large quantities are jobbing at the new prices. The exposition is rapidly getting its array of exhibits in shape and attracting visitors. The promise for a good fall trade has rarely been better.

ST. LOUIS.

Hoffer & Co., Pig Iron and Iron Ore Merchants, 214 Pine street, report to us as follows, under date of August 11, 1883: This market continues quiet. In fact, business of every kind is dull. We continue quotations of last week, as being fairly representative of what little market there is:

HOT BLAST CHARCOAL IRONS.

Missouri	$20.00 @ 20.50
Southern	20.00 @ 21.00
Ohio	25.00 @ 26.00

COAL AND COKE IRONS.

Missouri	20.00 @ 20.50
Southern	18.50 @ 20.00
Ohio	20.00 @ 25.00

MILL IRONS.

Red Short	18.50 @ 20.00
Neutral	17.00 @ 18.00

CAR WHEEL AND MALLEABLE IRONS.

Missouri	21.00 @ 22.00
Southern	25.00 @ 28.00
Ohio	23.00 @ 32.00

BALTIMORE.

W. N. Wyeth, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of Aug. 13, 1883: Trade for the past week has ruled from fair to satisfactory, considering the season, with strong indications pointing toward an active fall business at advanced values.

Ref. Bar Iron, 1 to 6 x ⅜ to 1	℔ lb	2⅛	@	2.35¢
" " 1 to 4½ x 1⅛ to 1	℔ lb	2⅛	@	2.35¢
" " ⅜ to 2, Round and Square	℔ lb	2⅛	@	2.35¢
Hoop Iron, 1¼ wide and upward	"	3 2-10	@	3 3-10¢
Band Iron, from 1¼ to 6 in. wide	"	2 7-10	@	2 8-10¢
Horse-shoe Iron	"	3⅛	@	3¼¢
Norway Nail Rods	"	5⅛	@	5½¢
Black Diamond Cast Steel	"	11	@	12 ¢
Machinery Steel	"	4½	@	5 ¢
Spring Steel	"	4	@	4½¢
Common Horse Nails	"	10	@	11 ¢
Railroad Spikes, 5½ x 9-16	"	2 6-10	@	2 7-10¢
Perkins' Horse Shoes, ℔ keg of 100 lb				$4.37½
" Mule Shoes				5 37½

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(*From Our Regular Correspondent.*)

London, July 30, 1883.

THE WEEK

has not brought forth much that has been of real importance in the leading metallurgical industries of this country, albeit there have been sundry minor variations to be presently noted. The weather has been a good deal broken, and for the most part colder than is customary at this season of the year, with a great deal of rain in some parts of the country. This state of things has not been favorable for the agriculturalists, and has given rise to renewed anxieties as to the now rapidly approaching harvest. As I write the temperature is much higher than it has been for over a week, and it is hoped that the genial warmth will continue; otherwise it is pretty certain that the cereals will fall off in quality, and the harvest will be disappointing. As I have intimated in former communications, a great deal depends upon the ingathering of the crops; a good or bad harvest, indeed, will mean millions of pounds sterling difference to us. The season so far has not been bad for the farmers, who have secured enormous hay crops, and have had an exceptional quantity of berries and small fruits, while the apples, &c., are most abundant. All that is wanted, and wished for by everybody, is a good harvest period, which it is to be hoped we may have. As the consummation of these hopes and fears is now so nigh at hand every variation is instantly registered; hence we may look for numerous fluctuations in open prices within the next few weeks. Should the weather become hot and thoroughly fine everything would be pretty certain to rise, and buoyancy would pervade all the markets, whereas with wet and an absence of sunshine we may safely forecast weakness and vacillation in all directions. Politically, we seem to have calmed down somewhat, and there are fewer indications of a rupture with France than was the case two or three weeks ago. The sudden collapse of the Suez Canal provisional agreement between our Government and M. de Lesseps has relieved the somewhat overcharged atmosphere here, although it is by no means unlikely to result in new complications and few real advantages to the discontented ship owners. The appointment of M. Waddington, who was educated in England and is highly esteemed here, as French Ambassador in London, is likely to diminish the friction between the two countries—a friction which was really becoming dangerous by reason of the Tonquin, New Hebrides, Madagascar and other "little affairs" promoted by our versatile and irritable neighbors. Besides this, the end of the session of Parliament is drawing near, and our politicians are losing the fiery zeal which is characteristic of the early days of the season. The country has no special reason to be ashamed of its legislature, taken as a whole, but it is a relief to get rid of them as a body, and to know precisely how much mischief or good they have done. All sorts of measures, declared to be of the most vital necessity at the beginning of the session have now been calmly thrown overboard, and the legislative ship is nearing port with vastly less canvas spread and less gas about her than when she set sail.

Socially, the London season proper has expired and has been decently interred, an enormous number of Americans assisting at the *soi-disant* obsequies. Many of the leaders of fashion have fled the festive scene and are now disporting themselves at the seaside, in Switzerland, at the German or French spas, or are taking life in a leisurely manner at their country seats. Something over 4,000,000 persons remain in this "brickfield" nevertheless, including I am afraid to say how many ladies and gentleman from the United States. For the time being we are almost American in our speech and surroundings, and "guess" pretty much as do our visitors. At the Society of Arts *conversazione*, held at the Fisheries Exhibition the other evening, the American contingent was in great force, and decidedly strong numerically out of the 7000 or 8000 persons present. Among those best known to your readers I may mention Mr. Carnegie and Mr. Phipps, of Pittsburgh, as well as your colleague, Mr. J. D. Weeks, of the same sable city. The Prince and Princess of Wales arrived about 11 o'clock with a brilliant *suite*. The Princess was declared to be "real nice" by some of the American ladies present. There being also a large contingent of noblemen and their better halves, as well as about half the members of the House of Commons and their wives, among the crowd, I fear that the ardent republicanism of the West may have became somewhat tempered and softened. It is certain, at all events, that an increasing number of Americans is constantly settling in and around London. Whether society here offers attractions not obtainable in your cities, or whether our climate (!) is deemed more healthy, I am unable to guess, but certainly the fact is as I have stated. Among the latest settlers is to be noted Mr. Carnegie, who is said to have taken a house in the fashionable west end of the metropolis, and who is credited with intentions, political and social, into which it would be very bad taste on my part to intrude at present. Mr. Carnegie is only one of many Americans who, having made their "pile," seem disposed to spend it here instead of in the States. I find that almost all the Americans I come across express a decided liking for London. They admit that Paris is a gay and enjoyable city; that Brussels is an elegant place, and that Dresden is "perfect," but after "doing" Italy, Switzerland and so on, they come back with an enhanced admiration for London. This feeling may, perhaps, arise from the fact that Americans are at home with our language, and, to some extent, with our manners and customs. It may be hightened by the liking of your people for "big" things, and their consequent *penchant* for the biggest thing in cities the world possesses. Whatever the cause, however, the effect is general, and is, I think, a warm and strong bond of sympathy and union between the two great English-speaking nations of the globe. London is a vast place, and has room for any number of good men from all parts of the world. While we absorb, however, we also emit, so that in the long run the migration amounts to an interchange rather than a growth at the expense of any other place in particular.

THE IRON MARKET

has been rather quieter since I last wrote as regards crude irons, some sorts of which have been depreciated in value by about 6d. ℔ ton. In the same way warrants have become rather cheaper, despite the excellent shipments from the Northern ports, the steadiness of the money market and the lessened political tension. The production of pig iron is doubtless still too heavy for the consumptive requirements of the market, and so long as that is the case we cannot hope for any material advance in values. Everybody knows that the means of production in reserve might at any moment enlarge the make by from one-third to a half as much more as the present output, particularly in the United States, so that nobody has any overwhelming inducement to aid a rise, which would certainly tempt the restarting of the furnaces now idle. With the same end in view, as well as other collateral considerations, individual furnace owners are yet running at their full capacity, so as to keep down the average prime cost, and are exercising severe economies in every department in order to keep in the field. In one sense they defeat their own efforts, but from an all round standpoint they are wise in their day and generation. They know that nothing short of an enormous growth of the demand could send up values, and as there is no likelihood of such an expansion, they "work from the other end," and seek by a larger turnover to obtain compensation for smaller profits on individual items. It is true that stocks are large and have a constant tendency to grow larger, but that is a point which is not worthy of consideration, it is urged, so long as the volume of sales is maintained. Accordingly, overproduction is ever present, and iron is made which cannot be sold. The time will come when the avalanche will descend with crushing weight, yet those who live and move under its very shadow ignore the danger, and proceed as though a million of tons of pig iron in stock were just the same as a million tons sold and worked up.

At Glasgow stocks are very large, and the comparisons between this and last year will be likely to grow more unfavorable to the present, inasmuch as the maximum quantity held by Connal's was reached about midsummer, 1882, since which there has been (in the main) a decrease. There being a tendency to enlarge the make in Scotlond, it may be assumed that operations are being conducted at a profit, but the assumption is not necessarily universally true, seeing that many of the ironmasters are also colliery owners, and may be willing to lose on iron in order to reap a profit on coal. I do not say they are now losing on iron, but the contingency is a possible, one and should be borne in mind. At Middlesboro' prices are a shade weaker, notwithstanding the very large shipments and a steady local trade. On the West Coast hematites are still very dull. The mine owners are stocking ore rather than sell it at current figures. The smelters complain in all directions, and have to meet buyers in order to effect sales. Throughout the Midlands pigs are dull and unsettled, owing to the Staffordshire strike, but are not unlikely to gain a little now that it seems probable that the whole of the men will have gone in by the end of this week. The ironmasters have convened a meeting in order to discuss the question of a general lockout, as a means of bringing to their senses the men of the West Bromwich district. These men—employed by Messrs. Dawes and two or three other firms—remain

out, while the great majority have gone in at the reduction, or at the old rates, pending a complete settlement of the dispute. It is deemed advisable, therefore, either to institute a general lockout, or to subsidize the ironmasters who are still fighting the general battle. The point will be decided at a meeting of the ironmasters convened for Thursday, Aug. 2, unless the men "cave in" meantime. Manufactured iron is irregular and nominal in South Staffordshire, but the cessation of production and some increase in the demand for sheets has a tendency to harden values. Until the final adjustment of the differences with the men, however, it would be a trifle rash to announce that prices are really higher. I give some leading quotations elsewhere in this letter. Steel rails are very dull and prices are nominal. In some quarters I hear of losses on contracts taken at £5 ℔ ton, but I have my own opinion on the subject, and if closely followed up I think it could be shown that there is a fair profit to be secured even at that price. Of iron rails a large cargo was brought to London last week for transshipment on Australian account. Old rails are quiet, but there are a few inquiries for D. H. for Philadelphia, just as there are small shipments of good No. 1 scrap iron for that port and New York. Blooms are quite dead for United States, and only very small lots of crop ends are wanted.

FREE TRADE, FAIR TRADE AND PROTECTION.

On Saturday, July 28, the annual meeting of the Cobden Club was held in London, Mr. Thomas B. Potter, M. P., in the chair. The report, read by the secretary, contained the following passages:

"In foreign countries the principal event is the adoption of a bill for the reform of the tariff by the United States Congress. It was of the nature of a compromise, and cannot be considered final. The duties have been simplified and reduced, except in a few instances. The reduction all round is about 12 per cent. The amount is small. The chief advantage is in simplification. It is evident that the matter cannot rest here, and that the question of tariff reform will be taken up in earnest in the course of the next Congress, if not in the next session. The conclusion of the new treaties with Italy this year, and with Portugal last year, is satisfactory, as defeating attempts to re-establish a system of differential duties in Europe. There are indications that in Spain a feeling is growing up in favor of a commercial treaty with this country. Remission of tariff is in contemplation in Italy and in Switzerland. In France the protectionists are showing signs of activity, and are disappointed that the new conventional tariff has not proved to be of a prohibitory nature. It is not likely that they will persuade the Legislature to have further recourse to bounties, and the treaties of 1881–82 will prevent any extreme reaction. In Germany public opinion seems to be setting against the recent protectionist policy, which is upheld by personal influence more than by any general sense of public interest. The time which has elapsed since the introduction of the important measures of fiscal reform adopted last year by the Government of India, under the able financial administration of Major Evelyn Baring, has not been sufficient to afford materials for an appreciation of their full effect, but those which already exist are of a most encouraging nature. The main features of the free-trade policy of that Government in Major Baring's budget of last year were 1. The entire abolition of all duties on importations into India, except on arms, ammunition, military stores (malt liquors, cider, liqueurs, spirits and wines), opium (when not covered by a Government pass), and salt. 2. The equalization and the reduction of the excise duty on salt. Remarkable statistics and calculations have recently been published tending to show that as railway communication increases in India, opening up the markets of the Western world to the vast population of the tillers of the soil of that country, India may hope to compete with all other sources of agricultural produce in supplying this country with corn in exchange for the products of Great Britain. The export of wheat from India rose from 2,195,550 cwt. in 1880 to 7,444,449 cwt. in 1881, and to 19,893,520 cwt. in 1882, or more than one-half of England's total imports of wheat from America in the year 1881, without any appreciable rise in price of wheat in India."

The chairman, in proposing the adoption of the report, referred to the secession of certain members of the club during the present year, and said the number did not amount to more than a dozen. "The Cobden Club," said Mr. Potter, "has been a useful institution in the past, and has considerable power all over the world. I think this influence will be greatly needed in the future, not merely abroad, but at home. It is useless to disguise the fact that protection is not dead in England. It is quite possible that efforts may be made to restore the food taxes, either directly or indirectly. As regards the food of the people, free trade must be rather developed than curtailed in its operation. The question of the supply of meat will, ere long, force itself on public attention. I believe that it will be found necessary to develop the import of live stock—not merely fat stock, but store cattle—with due precautions as regards disease. It is difficult to look into the future of the various industries of this country, but of one thing I feel certain—that the food of the people must never be interfered with, and the development of the trade must not be checked. It is quite possible that certain politicians may endeavor to restore protection under one guise or another. The Cobden Club will be a most useful organization for checking such a tendency. I appeal with confidence to our friends in the country to give us an unflinching and undiminished support in the future, as in the past." (Applause).

Mr. Rylands seconded the motion.

Mr. Thomas Briggs moved an amendment, attributing the slow progress of the club to the fact that the club has not declared customs and excise duties to be incompatible with free-trade principles.

Mr Walter Wren sympathized with the terms of the amendment, and would second it as an addendum to the report.

The chairman was sure the club had done the best that could be done under the circumstances to advance the principles of free trade, and he could only regard the amendment as a vote of censure upon the committee.

Only two votes were given for the amendment, and the report was adopted.

The meeting was brought to a close by a vote of thanks to the chairman, proposed by Sir Wilfrid Lawson.

The club, it should be said, has been weakened by the withdrawal of many of its most influential members, whose ostensible cause of quarrel was the fact that Mr. Chamberlain (an advanced Radical) was asked to preside at the annual dinner. These gentlemen, one would suppose, could not have been very earnest disciples of Cobden to take umbrage at such a matter. The club does not seem to gain in strength, perhaps because many Englishmen believe that it would be most mischievous and serious for us were you to discard your present fiscal system. The "National Fair Trade League," in its second annual report, states that while "for some time during 1882 there were appearances of returning vitality, the trade return of the current year shows the slender foundation for such hopes. The report states that the protectionist tone of foreign countries has in no degree abated, the new tariff law in the United States proving how keenly alive the people there are to the advantages of keeping their own custom for their own producers. During the second 12 months of the league's existence 139 meetings have been held, either in direct connection with the league or at which speakers have attended on its behalf, and 107,525 copies of its literature have been distributed." Fair trade, *alias* reciprocity, makes a very poor showing just now.

SCOTCH PIG IRON

is quiet, with warrants now standing at 47/5 @ 47/3, as against 51/6 @ 51/9 a year ago. At the latter juncture, however, there were only 109 furnaces at work in Scotland, whereas there are now 115 (including seven on hematites), and it is rumored that one or two more will shortly be put in blast. Stocks decreased last week to the extent of 408 tons, but still amount, in Connal's stores, to 584,763 tons, as compared with 633,545 tons a year ago. What makers themselves hold in reserve is unknown, but as the favorable statistics issued at the end of June, 1882, have not been repeated, it is presumed that the quantity so held has been augmented. The shipments last week were 80 tons above those of the same week of 1882. To date this year the total is 353,423 tons, or 1024 tons better than last year to same date. Imports of Middlesboro' pig iron into Scotland have been 150,484 tons, or 26,942 tons more than in 1882 to date. Writing from Glasgow on July 28, James Watson & Co. said: "Throughout the week the Scotch iron market has been very quiet, only a restricted business being done in warrants, and prices of the various shipping brands do not show much change. The Middlesboro' market is weaker, quotations being about 6d. ℔ ton easier. The warrant market was flat last Monday, the price receding from 47/4 to 47/1 ℔ ton. On Tuesday forenoon 47/ was accepted, rallying in the afternoon to 47/1½ ℔ ton. On Wednesday the market was firmer, 47/3 being paid in the morning, drooping, however, later on to 47/½, cash. Yesterday the price again recovered from 47/1½ to 47/3½, and to-day the improvement has continued to 47/5, cash, closing with buyers at the latter figure. The shipments last week were 13,843 tons, as compared with 13,763 tons for the corresponding week of last year." We quote:

	No. 1.	No. 3.
G. M. B., at Glasgow	48/6	46/6
Clyde, "	59/6	49/6
Coltness, "	65/	54/
Langloan, "	60/	53/6
Gartsherrie, "	57/	53/6
Summerlee, "	57/	53/6
Calder, "	57/	53/6
Carnbroe, "	55/6	49/6
Glengarnock, at Ardrossan	55/6	48/
Eglinton, "	49/	46/
Dalmellington, "	49/6	46/
Shotts, at Leith	59/6	55/
Kinneil, at Bo'ness	47/6	47/
Carron, at Grangemouth	49/6	47/6

MIDDLESBORO' PIG IRON

is singularly dull and low in value, considering the very heavy current of shipments and the certainty that the monthly returns of Associated Ironmasters for July will show a notable decrease in the stocks. Makers hold out for 39/6 @ 40/ for No. 3, and other sorts *pro rata*, but second holders will sell at 39/3, and even at 39/, for parcels of fair size. For G.M.B., f.o.b. at makers' wharves in the Tees, the current rates for cash, less 2½ %, on 10th of following month, are:

No. 1 Foundry	41/3	Mottled	37/9
" 2 "	40/	White	37/3
" 3 "	39/3	Refined Metal	55/
" 4 "	38/9	Kentledge	38/9
" 4 Forge	38/3	Cinder	34/

NORTHERN IRON TRADE AND WAGES.

The following return has been made by Mr. E. Waterhouse to the Board of Conciliation and Arbitration for the Manufactured Iron Trade of the North of England:

GENTLEMEN: Having collected from the firms and companies belonging to, or associated for this purpose with, your board, the returns of their sales of manufactured iron during the three months ending June 30, and having verified the same by an examination of their books, I certify the average net selling price ℔ ton to have been £6. 4/3. Beneath is a statement of the different different classes of iron sold, and the average net selling price of each. The sales of five firms which were not previously included are now given, and this accounts largely for the increased output.

SALES DURING THE THREE MONTHS ENDING JUNE 30.

Description.	Weights invoiced. Tons.	cwt.	qrs.	lbs.	Percentage of total.	Average net selling price per ton. £	s.	d.
Rails	928	18	2	15	0.54	5	16	1.22
Plates	116,400	6	1	27	66.98	6	6	9.39
Bars	21,454	0	3	17	12.34	6	7	7.02
Angles	35,027	7	1	20	20.14	5	13	11.92
Total	173,810	13	3	23	100.00	6	4	2.98

The wages changes of recent years were as follows:

DERBY SCALE, BY AGREEMENT BETWEEN STAFFORDSHIRE AND THE NORTH OF ENGLAND.

	Selling price. £ s. d.	Wages arranged. s. d.
May 31, 1874	10 18 11.76	11 9
Aug. 31, 1874	9 19 1.08	10 9
Nov. 30, 1874	9 1 5.13	9 9
Feb. 28, 1875	8 14 3.09	9 6

ARRANGED MUTUALLY AT DARLINGTON, FOR SIX MONTHS TO DECEMBER 31, 1875.

July 15, 1875	8 3 1.23	9 0

MESSRS. WILLIAMS AND MUNDELLA'S AWARD.

Dated Jan. 18, 1876	7 10 4.09	8 3

MR. DALE'S AWARD.

Dated April 13, 1878	6 7 4.01	7 6

MR. LEFEVRE'S AWARD.

Dated Jan. 13, 1879	6 0 5.57	7 0

THE SLIDING SCALE

Came into operation May 1, 1882.

March 31, 1880	6 2 11.45	7 9
June 30, 1880	6 10 8.90	8 0
Sept. 30, 1880	6 8 0.01	8 0
Dec. 31, 1880	6 4 3.96	7 9
March 31, 1881	6 3 7.45	7 9
June 30, 1881	6 2 1.74	7 6
Sept. 30, 1881	5 19 8.04	7 6
Dec. 31, 1881	5 18 11.18	7 0

BOARD OF ARBITRATION.

February, 1882, a strike took place, when the Board of Arbitration raised puddling 9d. ℔ ton, and other wages 7½ %.

	£. s. d.	s. d.
March 31, 1882	6 2 11	7 9

SIR J. W. PEASE'S AWARD.

In May, 1882, Sir J. W. Pease's award was given, and regulated wages up to the present time:

	£. s. d.		s. d.
June 30, 1882	6 7 0		8 0
Sept. 30, 1882	6 8 6		8 3
Dec. 31, 1882	6 8 6	Feb., Mar., Apr.,	7 9
Mar. 31, 1883	6 6 0	May, June, July,	7 9
June 30, 1883	6 4 3	August, &c.	7 9

Wages are now subject to one month's notice on either side.

HEMATITE PIG IRON,

are dull and slow of sale. West Coast mixed parcels of Nos. 1, 2 and 3 are obtainable at 49/ and upward, while maker's brands are:

	No. 1.	No. 2.	No. 3.
Cleator	55/	54/	53/6
Lonsdale	51/	50/6	50/
Workington	51/	50/6	50/
Lowther	51/	50/6	50/
Distington	51/	50/6	50/
Harrington	51/	50/6	50/
Solway	51/	50/6	50/
Maryport	51/	50/6	50/

Last week's shipments from these ports amounted to over 21,000 tons. North of England hematite pigs are quoted as below:

No. or quality.	Ordinary.	Bessemer.
No. 1	51/ @ ...	51/6
No. 2	50/ @ ...	50/6
No. 3	49/ @ ...	49/6
Mottled	... @ ...	49/6
White	... @ ...	49/6

THE LONDON IVORY SALES.

Respecting the results of these sales, in which your dealers have a yearly greater interest, I am advised by Messrs. Green & Pitt, Mincing Lane, as follows:

"After deducting all old import ivory, as well as the mammoth, sea horse and waste, from the 116¾ tons catalogued, there were about 98 tons only of actually new import elephant ivory, and this seems to us to have been scraped together with a tolerable amount of effort. The total of 116¾ tons is only 16 tons below the average supply for the third series of sales of the preceding 20 years; but this is to be accounted for by the smallness of the sales in 1881 and 1882, which were respectively 99¾ tons and 72½ tons. The average quarterly supply for 20 years is 130½ tons, so that the quantity in the present sales is about 14 tons below that average. Much of the ivory offered was of good and fine quality, though with some quantity of very inferior, stale and partly perished, particularly among the Egyptian. The Zanzibar and East Indian generally was very desirable, especially as regards the tusks, the cut stuff for the most part being good—embracing a large proportion of billiard-ball pieces of excellent appearance—though there was by no means a lack of inferior and defective rejections. Of the Egyptian about one-half consisted of tusks in excellent condition as regards freshness, though more or less cracked, the balance being rough, stale and weathered. The portion of scrivelloes was, however, again comparatively small. Respecting the Cape and Benguela soft, the quality was good, though showing very little extra sound; while the West Coast African, both Ambriz, Angola and Niger, were quite up to an average in quality, size and condition. The mammoth was again very varied, and the sea-horse tusks about an average. The salesroom was well attended throughout, and, notwithstanding the sales being large compared with the recent exhibit, a lively competition prevailed, and, except in very few instances, rather firmer prices were maintained, and the market quite sustains the intimations we have been continually giving in all our recent issues. The buying was not confined to any particular country, but, if anything, the French and German preponderated. The American orders were small, and the English bought cautiously.

"By comparison with the rates ruling in the April auctions, we consider that East India kinds, viz., Zanzibar, Bombay, Mozambique, Quillimane, &c., soft tusks of 100 pounds weight and above, went at £2 @ £3 decline, those between 50 pounds and 100 pounds at £3 decline, advancing to par, and those under 50 pounds at £2 @ £3 drop; hard tusks of 70 pounds and above receded £1 @ £2, and those between 40 pounds and 70 pounds, £2 @ £4, while what were under 40 pounds were rather firmer, on the whole. Billiard ball measurement cut pieces were, all round, £2 @ £4 higher, and the unmeasured cut points for balls were nearly always firm and in some cases a trifle dearer. Cut bagatelle points were a little irregular at from £1 to £4 advance. Cut points without balls, for cutlery and comb-making purposes, went very firmly. Cut hollows of large size were irregular, though on the average firm, the medium and small sizes being for the most part £1 @ £2 higher. Scrivelloes realized very full prices, and cores an advance of £2 @ £4. *Egyptian.*—Alexandrian soft tusks sold very firmly, and hard, the better qualities at £1 @ £2 advance; the more defective and inferior lots, £2 @ £4 (proving the defects by cutters' experience of previous lots to be of less extent than expected). Billiard-ball scrivelloes went firmly to £2 higher, and common scrivelloes at full prices for the soft and £1 @ £3 higher for the hard. Malta and Tripoli tusks of soft grain went at steady prices for such as were of about 35 pounds weight and upward, and the lesser weights were £2 @ £3 higher; the hard-grain tusks were all round firm, as were also the scrivelloes, both soft and hard; billiard-ball scrivelloes advanced £2 @ £3. *Cape of Good Hope.*—Tusks of 25 pounds and larger sold firmly, the larger sizes being rather dearer; billiard-ball and bagatelle scrivelloes were £2 higher, and common scrivelloes firm. The same observations may be made as respects the Benguela. *West Coast African.*—Ambriz, Angola and Niger show an improvement of £1 @ £3 all round, and even more for some lots of scrivelloes, prices being quite equal to those obtained in the recent Liverpool sales. The mammoth brought barely full prices. Sea-horse tusks were slightly higher for straight, especially those of less than 1 pound in weight, while the curved brought very full figures. Rhinoceros horns were a trifle easier, as might have been anticipated in consequence of the quantity, which was large, as compared with recent supplies. Bangle tusks sold well, at par to £2 per cwt. advance, with keen competition, which must have been caused solely by renewed demand for ball points, there being none for bangles, all orders for some time past having been either withdrawn or the limits for those in hand reduced, which may be an indication of the (prolonged) anticipated and customary periodical lull in the demand for bangle ivory in India. The next quarterly auctions are fixed to begin on Tuesday, October 23."

SOME CURRENT PRICES

are as appended:

	£	s.	d.
Copper sheets, 4 x 4, ℔ ton	74	00	00
Copper sheathing, ℔ ton	75	00	00
Yellow metal sheets, 4 x 4, ℔ ℔	00	00	6
Yellow sheathing, ℔ ℔	00	00	6⅛
Wallaroo copper, ℔ ton	69	00	00
Chili Copper, ℔ ton	63	15	00
Best selected ingot, ℔ ton	70	00	00
Brass wire, ℔ ℔	00	00	6¾
Copper wire, ℔ ℔	00	00	9
Composition nails, ℔ ℔	00	00	7¼
Copper tubes, ℔ ℔	00	00	9¾
Brass tubes, ℔ ℔	00	00	9
Sheet zinc, best brands, ℔ ton	18	10	00
Hard spelter, ℔ ton	10	00	00
Hard spelter, special brands, ℔ ton	10	10	00
Virgin spelter, ℔ ton	15	5	00
Virgin spelter, special brands, ℔ ton	15	12	6
Remelted spelter, ℔ ton	14	00	00
Straits tin, ℔ ton	95	5	00
English tin, in ingots, ℔ ton	98	00	00
Galvanized sheet iron, 18 & 20 G., ℔ ton	12	00	00
Galvanized sheet iron, 22 G., ℔ ton	12	15	00
Galvanized sheet iron, 24 G., ℔ ton	13	00	00
Galvanized sheet iron, 26 G., in felted cases, ℔ ton	16	5	00
Gas tubes, black, 72½ % off list.			
Gas tubes, galvanized, 57½ % off list.			
Boiler tubes, 60 % off list.			
Quicksilver, ℔ bottle	5	12	6
Tin plates, I C coke, ℔ box	00	16	6
Tin plates, I C coke, tin lined, ℔ box	00	17	3
Tin plates, I C charcoal, ℔ box	00	19	6
Cube nickel, ℔ ℔	00	3	6
German silver sheets, ℔ ℔	00	1	8
Bright iron wire, No. 0 to 7, ℔ ton	9	10	00
Fencing wire, 0 to 6, ℔ ton	9	00	00
Wire nails, 0 to 7, ℔ cwt	00	8	9
Bamboo steel, ⅝ up, ℔ ton	9	15	00
Regulus of antimony, ℔ ton	39	00	00
Crude antimony, ℔ ton	22	00	00
Lead, L. B. pigs, ℔ ton	13	5	00
Lead sheets, ℔ ton	13	12	6
Lead pipe, ℔ ton	14	5	00
Lead shot, ℔ ton	15	17	6
White lead (genuine dry), ℔ ton	19	10	00
Red lead (dry), ℔ ton	10	00	00
Tea lead, ℔ ton	17	10	00
Steel hoops, ℔ ton	9	10	00
Iron.—Swedish hammered bars, ℔ ton	9	5	00
Old boiler plates, ℔ ton	3	12	00
Old wire rope, ℔ ton	5	15	00
Old horse shoes (packed), ℔ ton	5	5	00
Belgian bars, No. 1, ℔ ton	5	5	00
Belgian nail rods, No. 1, ℔ ton	5	17	6
Anchors, ℔ cwt	00	14	6
Chain, ℔ cwt	00	11	00

FOREIGN.

FRANCE.

(Moniteur des Interets Materiels)

PARIS, July 30, 1883.—*Metals.*—Continued rains have injured crops a good deal lately both in this country and elsewhere, causing prospects for the fall trade to be less encouraging and a duller feeling in Metals. Prices in the latter have, nevertheless, been steady, and even slightly better, in all but Lead, which is lower. We quote at the close, in francs, ℔ 100 kg.: *Copper.*—Chili Bars, 165 @ 168.75; Ingots and Slabs, 171.50; Best Selected, 175, and Pure Corocoro Ore, 170. *Tin.*—Banca, 257; Billiton, 254; Straits and Australian, 250.50, and English, 250. *Lead*, 31.25 @ 32.25, and *Spelter*, 40 @ 40.50. *Iron.*—In this market dealers complain that consumers still hold back and do not feel disposed to touch Merchant Iron, even at the low figure of 18 francs ℔ 100 kg., there being offers from the rolling mills in the interior for less, deliverable in this city. During the past fortnight the situation had improved somewhat at the North, but we now hear that the better feeling and demand have vanished once more. It was hinted that not unlikely all the rolling mills in that region would curtail their output, but so far nothing of the kind has been done. With the ratification by the Chambers of the railroad agreement, business in the Iron line, however, enters upon a new phase; hence we may confidently look forward to a revival, which at this juncture will be most welcome. A project is on foot to place Algeria on the same basis as regards its tariff as the mother country; if carried out, this measure will prove beneficial to both; it is therefore applauded on all hands. The import of Pig Iron into France the first six months has been 174,022 tons, against 136,391 last year; of Finished, 48,783, against 63,695, and of Steel, 25,027, against 16,808. Of Iron Ore we have imported 800,918 tons, against 706,109 in 1882, and 611,850 in 1881. *Coal.*—Very little transpires; gradually preparations are made for the fall campaign, expected to be lively.

(L'Ancre)

ST. DIZIER, July 30, 1883.—*Iron.*—There is less doing, but at this time of the year business usually lacks activity; so far this dullness has, nevertheless, failed to bring down the price of Charcoal Merchant, still held at 19 francs ℔ 100 kg., Prime. Large orders are scarce at the Haute-Marne rolling mills; what demand there is is for prime classes of Iron. Mixed sells with greater ease than Coke Iron, prime of the former selling at 20 @ 20.50. Machine Iron is neglected; No. 20 Mixed, for wire-drawing, is firm at 20.50. Wire Nails are less in request, there being a falling off in export orders; No. 18 in bulk sells at 27.50, in small lots. There is less activity noticeable at the foundries. A slackening in the demand for Structural Iron is also observable, while for Hollow-ware and Stoves it has not yet manifested itself. The only inquiry there is is for the casting of Machinery: those turning out Pig Iron suitable for this branch are kept busy.

(Revue Industrielle.)

VALENCIENNES, July 31, 1883.—*Iron.*—The slight revival that took place the week before last has subsided since. Our rolling mills have still got the same difficulties to contend with. Whenever they think that at length they have succeeded in clinching a bargain, purchasers want further concessions; meanwhile they have still got a run of small orders, with which they manage to get along for the moment, without the assurance of greater jobs hereafter. Merchant Iron they cannot place any better than 16.50, and Sheet Iron has dropped below 21 francs ℔ 100 kg.

BELGIUM.

(Moniteur Industriel.)

BRUSSELS, July 31, 1883.—*Iron.*—The outlook in the Iron trade is again rather unsettled. People evidently were a little too sanguine with respect to the immediate future. There is certainly an improvement, but it is as yet slow, and has not as yet assumed the proportions of a revival in full. Pig Iron has become quite firm, especially in the Charleroi Basin; there an advance has been established, and the range is 5.80 @ 5.10 francs ℔ 100 kg. English Pig is well held at 5.80; Domestic Foundry Pig does not vary from 7.25; Athus-Halanzy Puddling Pig remains at 5 francs. Rolling mills in Belgium receive small orders steadily, and the rapidity with which delivery thereof is made proves that large ones are still scarce; but at any rate, they are kept moderately busy. The largest concerns, on the other hand, have made some important contracts. Steel Rails have sold as low as 11.50 francs. Merchant No. 1 has sold at between 12.50 and 12.75; Sheets at 16.50 @ 17. On taking a general view of the situation, it may be asserted that the tendency is a favorable one, but that no decided advance in prices has as yet been established. *Metals* are tolerably active and firm. We quote Copper 176 francs ℔ 100 kg.; Tin, Banca, 248; Billiton, 247; Pig Lead, soft, 31.25, and Spelter, 38. *Coal* remains in good position at 13 @ 10 francs; Domestic, 17 @ 19; Gas, 8 @ 14; Industrial, 8 @ 9, small; 9.50 for Coke; Coke, 15 @ 17 ℔ ton.

(Precurseur.)

CHARLEROI, July 30, 1883.—*Iron.*—The predicted revival has not yet come. There is an improvement, but it develops slowly. Pig Iron is firm, and has sold at improved rates at 4.80 @ 5.10; Domestic Foundry is steady at 7.25; No. 1 Merchant is well held at 12.50 @ 12.75, and Sheets generally bring 16.50 @ 17.

GERMANY.

(Borsenhalle.)

HAMBURG, August 1, 1883.—*Iron.*—Since the dissolution of the Siegen combination, the blast furnaces in Rhenish Westphalia have lowered their prices materially, so as to be able to compete with the Siegen makers, but the situation is not improved since. During all the month just brought to a close not much has transpired in Finished Iron, rolling millers being in the habit of taking stock during the month. There is not a sanguine feeling about the coming fall campaign. Wire mills in particular are in a rather embarrassed position, and as for the makers of railroad material, they complain of lack of occupation while in expectation of adjudications on the part of domestic railways. *Metals* are without animation in this city: Lead is weak at 13.25 @ 13.50 ℔ 50 kg., German; Spanish at 16.50 @ 17; English at 14.50 @ 15; Copper inactive at 70 @ 78; Tin, tolerably well sustained at 105 @ 108, and Spelter, without anything doing, 15.15 @ 15.50 marks.

HOLLAND.

(Koch & Vlierboom.)

ROTTERDAM, Aug 1, 1883.—*Tin.*—An advance of 75c. @ 1 guilder is asked for spot Tin, but there is not demand enough to warrant it. We quote Billiton, spot, 56.50; to arrive, 57; and Banca, spot, 57.25. Banca deliveries since January 1, 74,286 slabs, against 75,893 last year and 89,610 in 1881; Billiton do., 51,594, against 53,570 and 69,142; of Australian, 118 tons, against 538 last year. Price of Banca, 57.25, against 64.75 in 1882.

AUSTRIA.

(Austrian Trade Journal.)

VIENNA, July 31, 1883.—*Iron.*—Our Iron market forms for months past an enviable contrast when compared with other Continental markets. There has been all along great activity, notably for Pig Iron. The blast furnaces of Austro-Hungary cannot fill the domestic demand, so that everything is done, as has been indicated in previous reports of ours, to facilitate importation just at present, especially in Hungary, by means of freight reductions on the railroads. During the week under review there has, however, been some irregularity in Finished Iron in this market. The Emperor Ferdinand Railroad stands in need of 17 locomotives, to be adjudicated upon without delay.

CHILI.

(Weber & Co.)

VALPARAISO, June 12, 1883.—*Copper.*—Early in the month more favorable cable news from England started an active demand, some 1000 tons selling at $18.35 @ $18.65 ℔ quintal, on board, but soon after the rise in Exchange caused inquiry for export to slacken again and prices to recede to $17.95, at which there is more offering at the close. Total sales, 37,000 quintals; $17.95, with 2½ % commission, £2. 2/6 freight ℔ steamer and 35½d. exchange, is equal to £62. 8/5 cost and freight. *Nitrate.*—Contrary to expectation, there has been a quite decline, brought about by the rise in exchange, drooping European markets and higher freights, 246,000 quintals changing hands at $2.25, 95 %, which, with 3½ % commission, 35½d. exchange and 52/6 freight, is equal to 10 4½ ℔ cwt., cost and freight. At the close there is greater firmness. News comes from Iquique that refiners make great efforts to curtail production, while at Antofagasta and Taltal a petition to Congress is receiving signatures to the effect that the Government reduce the export duty.

NITRATE SHIPMENTS DURING THE FIRST FIVE MONTHS.

	1883. Quintals.	1882. Quintals.	1881. Quintals.
To Northern Europe	3,740,324	2,966,145	1,940,401
To the Mediterranean	92,748	74,517	8,901
To the United States	638,769	832,600	429,287
Total	4,477,842	3,863,262	2,378,589

Coal has been irregular; Orell at 32/ @ 33/6. *Exchange*, 35⅛d. @ 35½d., 90 days.

EAST INDIES.

(Ker & Co.)

MANILA, June 13, 1883.—*Metals.*—The demand for Galvanized Roofing Iron continues dull, Walker's Best Three Crown being quoted $4.87½, and other brands $4.50 ℔ quintal. There has been a fair inquiry for No. 1 Govan Pig Iron at $1.56¼ @ $1.62½, and for Govan Bar Iron at $3.75 ℔ picul. *Coal.*—Australian has been sold to arrive at $6.50 @ $6.62½ ℔ ton, cash, ex-ship, and Cardiff is inquired for at $8 ℔ ton, to arrive in two to three months. *Petroleum.*—The inquiry continues quiet, and only small sales can be made at $2.50 ℔ case. *Exchange*, 3/11¾d. for four months' sight bank bills on London.

(Hessenauer & Co.)

COLOMBO, June 23, 1883.—*Plumbago.*—Some business has been done at ensuing rates, in rupees, per ton: Fine Lump, 140 @ 150; Ordinary, 125 @ 130; Chips, 60 @ 70, and Dust, 40 @ 50. Shipments since October 1 to the United Kingdom, 77,658 cwts.; to Trieste, 205; to Havre, 755; to India, 3011, and to the United States, 113,806—together, 105,535, against 151,022 last year, 127,911 in 1881, and 125,720 in 1880. *Exchange*, six months' sight credit bills, 1/8½d.

(Dummler & Co.)

BATAVIA, June 9, 1883.—*Tin.*—The next Billiton sales, of about 10,000 piculs each, will come off in this city on the 27th inst., August 29, October 30, December 22; February 26, 1884, and April 29. *Iron.*—Swedish Bars are hardly saleable at 9 guilders; English Bars moderate, sales at 6.75; Horseshoe Iron has been taken at 8.12½; nothing doing in Hoops, Sheets or Corrugated Iron; there have been transactions in Yellow Metal at 56, and in Wire Nails from 10.75 to 11.50; Steel at 8.50. *Coal.*—There is no business doing for the moment, arrivals being nearly all for consumers, both from England and Australia; total import since January 1, 10,841 tons from the former and 16,054 from the latter. *Petroleum.*—No fresh sales to record; by the arrival of the Sokoto with 30,425 cases, the Leonatar with 20,130, and the Evie Reed with 22,340, supplies from New York sum up to date 446,478 cases. *Exchange*, six months' sight, 11.37½ @ 12 guilders ℔ pound sterling.

AUSTRALIA.

(Per Cable via London.)

SYDNEY, N. S. W., July 16, 1883.—*Iron.*—There is a brisk demand for leading brands of Pig and Finished Iron, as well as for Metals generally. We quote Galvanized Iron No. 26, £21. 7/6; Fence Wire, No. 8, £12. 7/6. *Tin.*—Total shipments from Australia and Tasmania during the first half of the month, 400 tons.

A singular mishap, occasioning some delay, is reported as having recently occurred on the Central Pacific Railroad. A freight train was immediately in front of the passenger train, and had, among other cars, one of oil, which leaked badly, flooding the rails with oil, and the overland train, when it reached the spot, came to a standstill. The sand boxes were opened, and it was with great difficulty that the train could be moved at all. Finally, it was cut in two, and each part started separately. It took two hours to make a distance of five miles.

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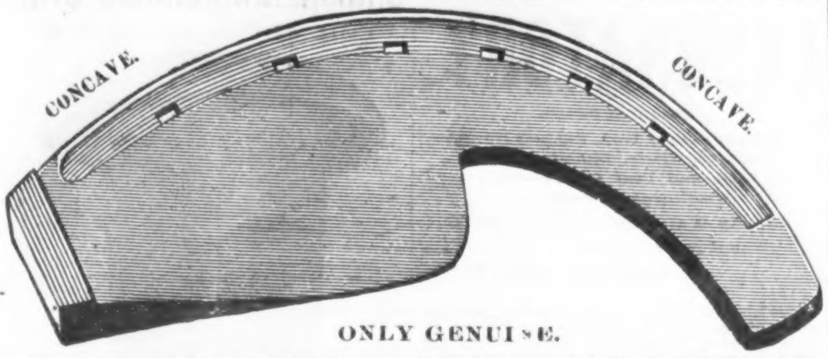

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No. 1, Full Length, Concave, 5 inches, Weight, per Set of Eight Shoes, 3 pounds.
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Packed in boxes or kegs of 100 pounds, half each rights and lefts. Full weight, and no charge for packages.

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" 500 " " .... 12 " "
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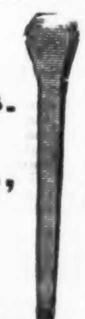

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Nos	5	6	7	8	9	10
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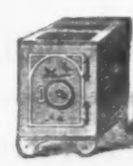

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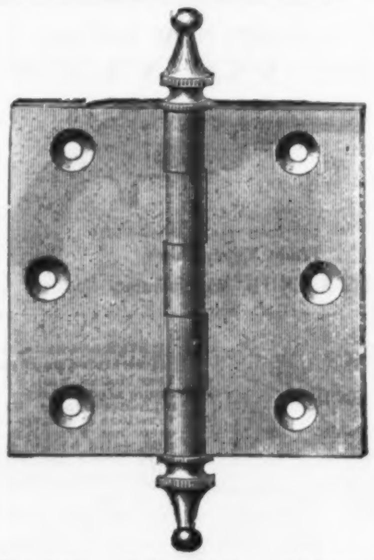

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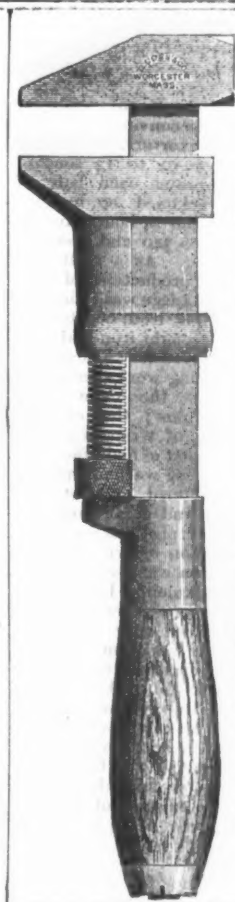

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PATENT

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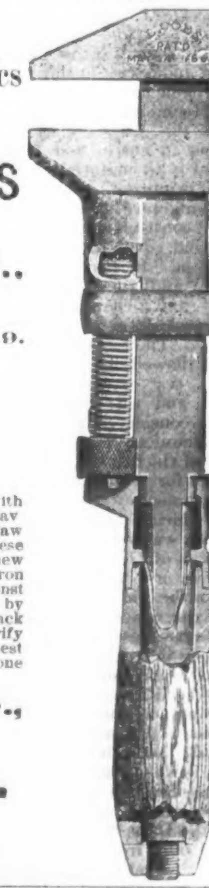
ESTABLISHED IN 1839.



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1883.

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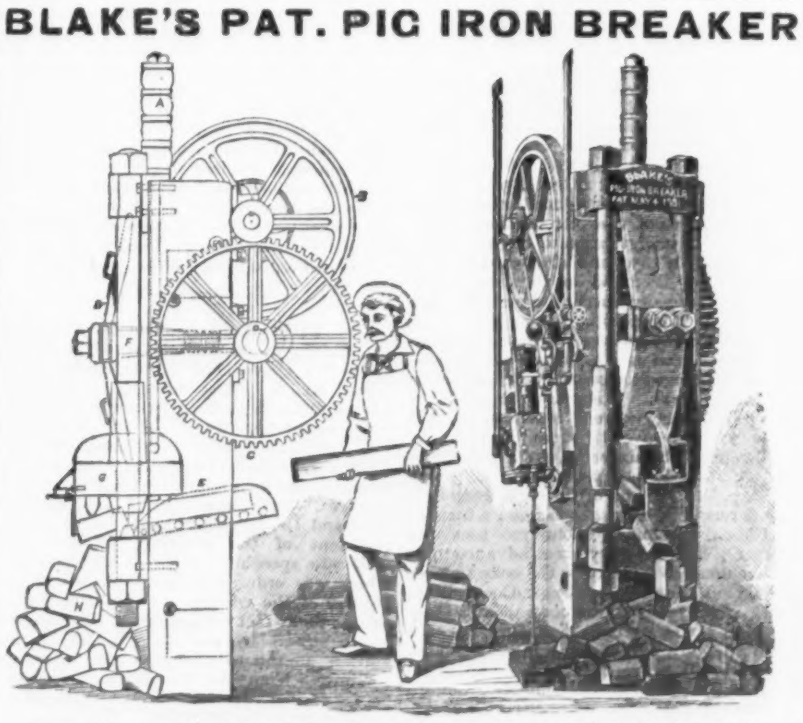
PERRIN BROS., Lafayette, Ind.

BLAKE'S PAT. PIG IRON BREAKER.



A new and successful machine for breaking pig iron into any length desired, with rapidity and economy. Besides saving in cost of breaking by hand, it secures the greatest economy in melting. Several machines already in use. Every machine guaranteed against breakage of parts. Requires but three horse-power. Can be run by belt or have small engine attached.

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Manufacturers' Agents,

101 READE STREET, NEW YORK.

Iron and Chain, Heavy and Wagon Hardware

RAILROAD & BUILDERS' SUPPLIES, &c.

ARTESIAN WELL MACHINES.

For our Full Page Advertisement, See First Issue of Each Month.

Belgian Iron Manufacture.

In a paper on the history of the iron and coal industries in the Liége district, read at a recent meeting of the British Institution of Mechanical Engineers, it was remarked that the discovery in 1870 of ancient furnaces at Lustin and Namur, Belgium, still filled with materials, throws some light on the primitive methods employed for the manufacture of iron. The furnace in each case consisted of a single excavation in the ground, oval in form and rounded at the bottom. It was about 12 feet long by 9 feet wide and 3 feet deep, formed in a bed of clay, and a channel pierced through the clay allowed air to enter the bottom of the furnace. The metal found in this hollow portion showed, on analysis, 93.48 per cent. of iron, 0.37 of carbon, 4.94 of fusible materials and 1.21 of sulphur and phosphorus. It is considered probable that the Romans communicated to the ancient Belgians the use of the bellows, which had been known to them for a long time, and that other improvements were made in the metallurgical art during their rule. The impulse thus given was very probably checked by the invasion of German tribes. The *Fourneau à Masse* or "*Stueckofen*" which was higher than the old furnaces and thus allowed a greater concentration of heat, is supposed to date back as far as the eighth century. Between the eighth and twelfth centuries the iron trade developed considerably, and the low countries are cited as the district where the manufacture had at that time reached its most advanced state. From that time until the fifteenth century the progress made was comparatively inappreciable. In 1468 the iron works of the Liége district were almost entirely destroyed by the troops of the Duke of Burgundy. Up to this time malleable iron was almost the only product, but the metallurgist, Karsten, observes that the first apparatus for producing cast iron was established in the low countries, whence the art extended into Sweden and England. The oldest blast furnace appears to have been constructed near Namur in the year 1340. It is, at any rate, certain that before 1400 the foundry-pig blast furnaces of Les Vennes and Gribegnée, near Liége, were well known. During the succeeding three centuries the number of blast furnaces grew very rapidly, so that in 1700 an edict of the Prince Bishop of Liége forbade the erection of any new furnaces for the next 25 years.

Coke as a fuel for blast furnaces was introduced from England at a relatively recent period. In 1769 an attempt was made to smelt iron ores by means of coke, but without success. Wood becoming scarce, raw coal had been used for the finish of malleable iron as early as 1627, but its employment in the process of transforming cast iron into malleable iron was also of foreign origin. This process became common in England while it was still unknown in Belgium. It was in 1784 that Cort and Partnell invented in England the puddling furnace and grooved rolls. Those improvements were introduced into Belgium, but the French Revolution shortly afterward put an end to all progress in industrial arts, and the works of the Liége district were in great measure reduced to a condition so deplorable that it was necessary to close them. There was, however, no long intermission of inactivity. In 1800 circular blast furnaces were found to be replacing the octagonal furnace hitherto in use. Their hight was at the same time raised from 15 to 25 feet. In 1803 the casting of cannon was commenced at Liége, and soon became the largest industry in the province. The idea, however, was still general that the coal of Liége was not fit for making coke, and it was not until 1823 that an Englishman whose name has become celebrated—John Cockerill—erected at Seraing the first blast furnace using coke as its fuel. This furnace remained unique of its kind until 1830; it was the origin of the works of the Cockerill Co., now one of the most important on the Continent. About the same time—in 1821—Michael Orban erected at Grivegnée the first puddling furnace and the first rolling mill on the English pattern. After 1830 the iron trade of Liége made a sudden start under the double influence of the introduction of railways and the inauguration of large financial companies. In 1839, and afterward in 1848, serious crises occurred in the trade; but these reverses were succeeded on both occasions by new advances in prosperity.

So far as an improvement in the methods of working iron is concerned, the following particulars will show the progress which has taken place: It is known that the low hearths formerly in use produced in 1546 about 300 kg. (6 cwt.) of iron in 24 hours. At the end of the sixteenth century the blast furnace then in use produced about 3 tons per day. At the end of the eighteenth century it remained almost the same; a furnace at Chimay produced about 720 tons per annum. For any very great advance upon this we must go forward to the coke furnace erected at Seraing by John Cockerill in 1823. This furnace produced about 10 tons in the 24 hours. About 1840, furnaces of a new type, erected about the same time in the Cockerill works and in those of Espérance and of Grivegnée, regularly produced 14 tons of foundry pig, or 20 tons of refinery pig, per day. In 1848, 24 tons was considered a good average make per day, and in 1860 the Grivegnée furnaces, which gave the best results in production, did not run more than 9000 tons of pig per annum, or about 25 tons per day. The make has now very largely increased. The Seraing furnaces produce from 65 to 68 tons of Bessemer pig per day, while at Ougrée two furnaces produced altogether in 1882 more than 41,000 tons. In making pig iron for ordinary puddling a make of more than 90 tons per day has been attained. The blast furnaces at Esch-sur-Alzette, in the Grand Duchy of Luxembourg, produce as much as 110 tons per day.

As to wrought iron, it is difficult to give exact figures. The skill of the workman is a main element in the quantity produced; and the improvements effected by the substitution of coal for wood have had a large influence on the price, without greatly changing the capacity of production. The attempts to puddle by machinery have had little success, and progress has been realized chiefly in the economy of fuel by means of gas furnaces, especially the Bicheroux furnace. Whereas formerly about 1 ton of coal was required for every ton of puddled bar produced, 550 kg. (11 cwt.) are now sufficient.

As regards steel, we will only consider the steel produced by the converter process. The first Bessemer converters, erected at Seraing in 1863, gave 10 to 12 tons of steel per day. At present each pair of converters may be reckoned on to give from 150 to 160 tons in the 24 hours, and on the new American system 340 and even 360 tons have been obtained. As a matter of statistics, the annual production of the works in the province of Liége was estimated in 1829 at 7078 tons of pig iron, 660 tons of castings, 5011 tons of wrought iron and 4778 tons of iron manufactured for various purposes. The manufacturing works employed 711 workmen. In 1850, the make of pig iron had risen to 65,393 tons; that of castings to 7688 tons; that of wrought iron to 23,252 tons, and, lastly, that of manufactured iron to 7093 tons. In 1882 we find that the province of Liége contained 13 blast furnaces actually in blast, and employing 1215 workmen. The make of pig iron was 238,968 tons. The production of wrought iron and of manufactured iron was 126,461 tons, and occupied 5180 workmen. Lastly, the steel works contained 9 converters, produced 171,937 tons, and occupied 2747 workmen. The average wages of the workmen employed at the blast furnace is 3 francs (2/6) per day; those employed at works for making or for working up wrought iron get an average 3.46 francs (2/10½) per day; while those employed at the steel works, properly so called, have, on an average, 3.58 francs (3/) per day. These works, on the whole, have been actuated by 473 engines of various kinds, giving a total power of 14,688 horse-power.

Scrap Iron in China.

The London *Iron Trade Exchange* remarks that the Chinese make very slow progress in the march of civilization; indeed, some of their movements bear a strong resemblance to a retreat to the depths of barbarism. The prospects of developing the iron trade in the Celestial Empire are darkened by a mania which has seized them for utilizing scrap iron, instead of importing manufactured iron suitable for their requirements. Table knives are not needed in China, but for agricultural and general purposes the Chinese have a knack of converting old horseshoes into cutting instruments, and they prefer these homemade goods to the most tempting productions of Sheffield. They also convert old horseshoes into fish-plates for strengthening the axles of native wagons. The Chinese demand for scrap iron has developed marvelously during the last few years, and Shanghai is now a great depot for old iron, which is brought as ballast by ships from England. Lieut. H. N. Shore, in a paper published in the last issue of the *Journal of the Society of Arts*, states that at Shanghai acres of ground are covered with old iron awaiting shipment to the interior. Old hoop iron, boiler plates, cart-wheel tires, and every description of old iron, are being sent up country for conversion into agricultural implements.

This remarkable proclivity for scrap iron threatens to seriously interfere with the demand for bar and merchant iron, and it is perhaps not difficult to trace its origin. The Eastern trade has been cut up by the competition of Belgian makers, and quality has been entirely lost sight of in the struggle for indents. Imitation Swedish iron is an article of commerce chiefly manufactured for the India and China markets, and, beyond the name, it usually bears no resemblance to the article it is supposed to imitate. The Chinese like a good soft iron that is easily worked, but they have been deluged with the commonest rubbish that is produced. At length John Chinaman has kicked, and, having discovered a remedy, he prefers good scrap to bad finished iron. In the economy of business it is almost impossible to injure another without suffering one's self, and those who have palmed off spurious iron on the unfortunate Chinese have now leisure to repent of their having closed what should have been a good market for good iron.

The First Woolen Mill in America.—Referring to an article which appeared under the above head in one of our recent issues, Mr. W. H. Wetherill, of Philadelphia, informs us that in the month of March, 1775, a meeting was held in Carpenter's Hall, of that city, by the subscribers to what was called the United Company of Philadelphia, for promoting American manufactures. Each share value was fixed at £10, and Dr. Benjamin Rush, being chosen president of the meeting, delivered an elaborate speech in favor of the industry, which was ordered to be published at the request of the company. The latter established their factory corner of Market and Ninth streets by renting a house, lot and garden at the rate of £40 per year. A committee from the shareholders were to be in regular attendance, one of the four being changed each week. The fines imposed were 6d. for lateness and 1/ for non-attendance, but half an hour from the time called for by the four best watches present was allowed each party. Skilled workmen were employed, some of them working out their "redemption" money by services at the factory. Although the industry seems to have started on wool, its growth included flax and hemp.

The city of Geneva, Switzerland, is about to utilize the water-power of the Rhône for the construction of a great central motive-power factory. The power is to be derived from the river at a point about 1000 yards above the junction of the Rhône and Arve, and between there and the mill of Vernier. Powers are solicited from the Swiss Council of State by the town council of Geneva to utilize this power for a period of 99 years. The execution of the project will put the city of Geneva in possession of several thousands of horse-power cheap; it will develop the water service, and permit the lighting of the town by electricity. The Geneva State will undertake not to authorize any opposition scheme. The water-power will be utilized by means of a dam across the river, furnished with discharge ways for flood waters. Turbines will be erected on the right bank of the river, and will be capable of utilizing a minimum volume of 120 cubic meters (about 4200 cubic feet) per second, with a fall of four meters (about 13 feet).

Speaking of railway accidents, a contemporary remarks, very appropriately, that it is a very serious question whether railroad telegraph operators are not frequently taxed beyond their capacity, by being obliged to remain on duty for such protracted periods that their mental perceptions are blunted, and they "forget" to execute orders, as in a recent instance. A counterpart of this disaster is furnished by reports of a recent occurrence in England, when important signals were disregarded, because both the locomotive engineer and the fireman of an express train were asleep. There are limits to human endurance and alertness, which should be as carefully considered as the relations between the various mechanical features of railway systems, and the failure to fully recognize this fact is the primary cause of a considerable number of destructive "accidents."

Engineering (London) states that during recent researches of Professor Hughes, he found that certain kinds of brass are appreciably magnetic. This is probably due to iron impurities in the zinc used in making the brass alloy, and as brass free from magnetism is important for making some kinds of electrical apparatus, it would be well if makers would turn their attention to the matter.

Leadville has now six smelters, whose combined capacity is 775 tons of ore a day. It has also two stamp mills of a capacity of 80 stamps. Over 800 tons of ore per day are thus used in Leadville, while about 450 tons are shipped to other points. The total output for the year 1882 of the Leadville district was $17,181,853, and it is expected that the yield of the present year will be still greater.

The plan of telegraphing by flashing signals between the islands of Mauritius and Reunion, which we announced as projected some time ago, has now been realized. Observers in Mauritius can read the signals, and thus the proposed telegraph may be considered practicable, though all the arrangements for announcing cyclones, &c., are not yet completed.

Messrs. John Roach & Son launched their 100th vessel on Tuesday, August 7.

NEW YORK WHOLESALE PRICES, August 15, 1883.

(For Wholesale Hardware Prices See Pages 31, 32.)

METALS.

IRON.—DUTY: Bars, 8-10c to 1 1-10c ℔; provided that no Bar Iron shall pay a less rate of duty than 35 per cent. Sheet, 1 1-10c to 1 5-10c ℔. Band, Hoop and Scroll, 1c to 1 4-10c ℔. Pig and Scrap, 3-10 of 1c ℔. Plate, 1¼c ℔. Railroad Bars weighing more than 25 ℔ yard, 7-10 of 1c ℔.

American Iron

Foundry, No. 1	ton $22.00 @ 23.00
Foundry No. 2	ton 20.00 @ 21.00
Gray Forge	ton 18.50 @ 20.00

Scotch Iron.

Eglinton	ton 21.00 @ 21.50
Carnbroe	ton 22.50 @ 23.00
Coltness	ton 24.00
Shotts	ton 24.00
Glengarnock	23.00
Gartsherrie	ton 24.00
Langloan	ton 24.00
Summerlee	ton 23.00 @ 23.25
Carron	ton 23.00

Rails.

Steel at Eastern mills	ton 38.00
Old Rails Ts	22.50 @ 24.00

Scrap.

Wrought, ton from ship and yard .... 23.50 @ 25.00

Bar Iron from Store.

Common Iron
⅜ to 1 in. round and square; 1 to 6 in. x⅜ to 1 in. ... ℔ 2.10 @ 2.20c
Refined Iron:
⅜ to 2 in. round and square; 1 to 6 in. x⅜ to 1 in. ... ℔ $2.30 @ 2.40c
1 to 6 in. x¼ and 5-16 ... ℔ 2.50 @ 2.60c
Rods—⅝ and 11-16 round and square ... ℔ 2.40 @ 2.50c
Bands—1 to 6x3-16 to No. 12 ... ℔ 2.70 @ 2.80c
Norway Nail Rods ... 5 @ 5¼c

Sheet Iron.

	Common American	R. G. American
Nos 10 to 16	℔ 3.15 @ 3.30c	4 c
17 to 20	℔ 3.40 @ 3.60c	4 c
21 to 24	℔ 3.65 @ 3.90c	4¼c
25 to 26	℔ 4.00 @ 4.25c	4½c
27	℔ 4.25 @ 4.35c	5 c
28	℔ 4.40 @ 4.65c	5¼c
	B. B.	2d qual.
Galvanized, 10 to 20	℔ 6½c	5½c
Galvanized, 21 to 24	℔ 7 c	6 c
Galvanized, 25 to 26	℔ 7½c	6½c
Galvanized, 27	℔ 8½c	7 c
Galvanized, 28	℔ 9 c	7½c
Patent Planished	A ℔ 10½c	B. 9½c
Russia	℔ 13 @ 14c	
American Cold Rolled B. B.	℔ c @ 7¾c	

COPPER.—DUTY: Pig, Bar and Ingot, 4c; Old Copper 3c ℔. Manufactured (including all articles of which Copper is a component of chief value), 35 % ad valorem.

American Ingot ... ℔ See Trade Report.

SHEATHING BRAZIERS COPPER, BOLTS, &C.

Braziers' Copper, ordinary sizes, 16 oz. per sq. ft., and over	℔ 26c
Braziers' Copper, ordinary sizes, under 16 oz. and over 12 oz., ℔ sq. ft.	℔ 28c
Braziers' Copper, 10 oz. and 12 oz., ℔ sq. ft.	℔ 30c
Braziers' Copper, Lighter than 10 oz. ℔ sq. ft.	℔ 32c
Circles less than 84 in. in diameter	℔ 28c
Circles 84 in. diameter and over	℔ 31c
Segment and Pattern Sheets	℔ 28c
Locomotive Fire Box Sheets	℔ 26c
Sheathing Copper, over 12 oz. ℔ sq. ft.	℔ 24c
Bolt Copper	℔ 26c
Copper Bottoms	℔ 31 @ 26c

No Copper is Sheathing except 14x48 inches, and not to exceed 34 oz. to the sq. ft.

TINNING.

Sheets 14 x 48 ... ℔ sheet 8c
All other size Sheets, 2½c ℔ sq. ft.
For tinning both sides, double the above amount.

O'NEILS PATENT PLANISHED COPPER.—Net.

14x48.
and 16 oz. and heavier .. ℔ 37c By the case ℔ 36c
oz. and lighter ... ℔ 40c " ℔ 39c

Boiler Sizes.

7 in., 14x52. 8 in., 14x56. 9 in., 14x60.
4 and 16 oz. and heavier .. ℔ 39c By the case ℔ 38c
(And all sizes not over 20 in. wide.)

24x48&30x60.
14 and 16 oz. and heavier ... ℔ 41c
oz ... ℔ 44c

SHEATHING METAL.

Yellow Sheathing metal ... ℔ 20 @ 22c

BRASS.

Brown & Sharpe's Gauge the Standard for Metals. Old English Gauge the Standard for Wire.

BRASS MANUFACTURERS' PRICE LIST.—dis. 30 %.

June 10, 1880.

Cash prices for Roll and Sheet Brass. For less quantities than 100 ℔s add 3c. ℔.

HIGH BRASS.

All Nos. not thinner than No. 28, wider than 2 in., not wider than 14 in. ... 30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in., inclusive ... 35c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in., inclusive ... 38c
½c. ℔ advance on each No. above Nos. 28 to 36, inclusive.
All Brass thinner than No. 38 is Platers' Brass, at ... 43c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 in., in width wider than 2 in. 37c
Printers' Rules ... 45c
Sheets wider than 30 in. and under 40 in. ... 47c
" 40 in. and over ... 50c
Circular Sheets, in diam. from 4 in. to 14, inclusive .. 40c
" over 14 " 20 " .. 45c
" " 20 " 30 " .. 49c
" " 30 " 40 " .. 55c
" " 40 in. ... 59c

LOW BRASS.

Four cents ℔ more than High Brass
Gilding Metal, 8c ℔ more than High Brass.
Platers' or Gold Metal: In Bars ... 48c; Sawed ... 51c; Planed or Polished ... 54c

FOR SLITTING.

Metal, in width 1 in. to ½ in. to No. 28, inclusive, 1c ℔ advance.
Metal, in width 2 in. to 1 in thinner than No. 28, 2c ℔ advance.
Metal, in width 1 in. to ½ in thinner than No. 28, 3c ℔ advance.
Metal in width ½ in. to ¼, inclusive, not thinner than No. 28, 2c ℔ advance.
Metal in width ½ in. to ¼ thinner than No. 28, 5c ℔ advance.
Metal, ¼ in. in width and less, 10c ℔ advance.
Any of the above widths cut to particular lengths, add 7c ℔.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire
per cent., 12 inch to No. 26	$0.52	$0.70
" " "	.56	.76
" " "	.64	.88
" " "	.74	1.03
" " "	.8[illegible]	1.12

German Silver Sheets over 12in. wide and weighing more than 10 ℔., $1 ℔.
Advance 2c. for each additional inch in width above 12 in. and 2c. ℔ on each No. thinner than Nos. 26 to 12, inclusive.
All German Silver thinner that No. 36 is Platers', at 40c. ℔ additional.
German Silver Scrap, one-half less than net price of 12 in. Market Metal. German Silver Turnings, Filings and Chips, half the price of Scrap.

BRASS AND COPPER WIRE.

	High Brass.	Low Brass.	Gild'g and Copper.
No. 0 to 20	$0.33	$0.37	$0.48
No. 21	.36	.40	.46
No. 22	.37	.41	.47
No. 23	.38	.42	.48
No. 24	.40	.44	.50
No. 25	.43	.47	.53
No. 26	.46	.49	.55
No. 27	.48	.52	.58
No. 28	.52	.56	.63
No. 29	.55	.59	.66
No. 30	.58	.62	.72
No. 31	.62	.66	.76
No. 32	.66	.70	.84
No. 33	.70	.74	.93
No. 34	.74	.78	1.03

Spring Wire 2c ℔ advance
Flat Square and Half-Round Wire 5c ℔ advance on Round Wire.
Fancy Wire not less than 10c ℔ advance on Round Wire.
Brass Rods, No. 8 and larger, not less than 2 feet lengths, 38c.
Wire straightened and cut smaller than No. 8 and not less than 2 feet lengths, 43c.
Wire and Rods less than 2 feet lengths, special rates.
Twelve cents per ℔ extra for spooling on 1 ℔ spools No. 36.

MISCELLANEOUS.

Brass Pail Ears ... $0.40
Brass Door Rail ... .43

SCRAP.—Net.

High Brass Scrap ... 12c
Low Brass Scrap ... 13c
Gilding ... 16c
Turnings, Filings and Chips half the price of Scrap. Terms—Net cash. Interest to be added after thirty days.

TUBING.—dis. 30 %.

Plain to No. 20 inclusive above ¼ in. to 3 in. ... ℔ $0.43
Plain above 3 in. ... [illegible]
Nos. 21, 22, 23, two cents advance on List for each Number.
Nos. 24, 25, 26, four cents advance on List for each Number.
Above No. 26, special rates.
Plain, ⅛ inch ... 72
Plain, 3-16 inch ... [illegible]
Plain, ¼ inch ... [illegible]
All Mandrel Drawn Tubes, 5 cents advance on List Prices.
Fancy Tubing to No. 20 ... [illegible]
English, Scotch and Extra Patterns Fancy Tubing to No. 20 ... 55
Tubing Sawed or Cut 2 to 4 feet long, 2 cents ℔ advance on List
Add two cents, ¼ cent for each additional cutting under 2 feet.

All Mandrel Drawn Tubes under 25 in. ⅜c ℔ advance.

ZINC TUBING—dis. 25 %.

Plain	27
Fancy	33
Scotch and Extra Patterns	36

GERMAN SILVER TUBING.—dis 25 %.

4 Per cent	.80
6 Per cent	.90
9 Per cent	1.00
12 Per cent	1.20
15 Per cent	1.35
16 Per cent	1.45
18 Per cent	1.50
20 Per cent	1.60

STEEL.—DUTY: Ingots, Bars, Sheets, &c., valued at 4c ℔ or less, 45% ad val. Valued above 4c and not above 7c ℔, 2c ℔; valued above 7c and not above 10c ℔, 2¾c ℔; valued above 10c ℔, 3¼c ℔. *Extras.* Steel bars, rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, ¼c ℔ in addition to above. Steel Circular Saw Plates, 1c ℔ in addition to the above.

American Cast Steel.

For American Steel see quotations under heading of Pittsburgh.

English Steel.

Best Cast	℔ 15½c
Extra Cast	℔ 16½c
Circular Saw Plates	℔ 16c
Round Machinery, Cast	℔ 10c
Swaged, Cast	℔ 18c
Best Double Shear	℔ 15½
Blister, 1st quality	℔ 13c
German Steel, Best	℔ 11c
2d quality	℔ 10c
3d quality	℔ 9c
Sheet Cast Steel, 1st quality	℔ 15½c
2d quality	℔ 14½c
3d quality	℔ 12½c

ANTIMONY ... See Trade Report

LEAD.—DUTY: Pig, $2 ℔ 100 ℔. Old Lead, 2c ℔. Pipe and Sheet, 3c ℔.

American	4½ @ 4⅝c
Bar	6c
Pipe	6¼c. dis 10 %
Tin Lined Pipe	15c. dis 10 %
Sheet	7½c. dis 10 %
Shot	Drop 7c, Buck, 8c
Chilled Shot	8c

BABBITT METAL.

N. P. U. ... ℔ 8c
A. 28c; B. 25c; C. 15.

TIN.—DUTY: Plates, Sheets, Tagger and Terne, 1c ℔; Bars, Block and Pigs free.

Banca	℔ 23½c
Straits	℔ 22½c
English	℔ 23 c

TIN PLATES.

I C 10x14 / I C 14x20, Prime Charcoal	$6.25 @ 6.75
Second quality	$5.87½ @ 6.25
I C 12x12 Prime Charcoal	6.50
I X 10x14 / I X 14x20, Prime Charcoal	7.75 @ 8.00
Second quality	$7.25 @ 7.40
I X 12x12, Prime Charcoal	8.25
D C 12½x17, Prime Charcoal	5.75
D X 12½x17, Prime Charcoal	7.25
For each additional X add	1.50

COKE TIN PLATE.

	Best.	Ordinary.
I C 10x14 / I C 14x20	$5.50	$5.15 @ 5.40
I C 12x12	5.75	5.40 @ 5.50

TERNE PLATE.

	Prime Char.	2d Qual.	Coke.
I C 14x20	$5.40 @ 5.62½	5.25	5.12½
I X 14x20	7.25 @ 7.50	....	....
I C 20x28	10.75 @ 11.25	10.50	10.00 @ 10.25
I X 20x28	15.00	....	....
I C 20x200	13.50	....	....
I C 14x20 M. F. Brand	$7.75		

SOLDER—½ & ½ ... 15c
Extra ... 13½c
No. 1 ... 12 c

SPELTER.—DUTY: In Pigs, Bars and Plates, $1.50 ℔ 100 ℔.
American, cash ... 5.00 @ 5.25

ZINC.—DUTY: Pig or Block, $1.50 ℔ 100 ℔; Sheet 2½c ℔.
Sheet, Cask ... 6½ @ 6¾c
Sheet, Open ... 6⅞ @ 7c

Paper Stock, &c.

(Dealers' Selling Prices.)

	Cents ℔ ℔
White Shirt Cuttings No. 1	7 @ 7½
White Shirt Cuttings, No. 2	6½ @ 6
Mill Assorted Whites	5¼ @ 5½
Unbleached Muslins	6¼ @ 6¾
City Whites, No. 1	4½ @ 4¾
New Canton Flannels	[illegible]
New Seconds light	[illegible]
New Seconds dark	[illegible]
No. 2 Whites	[illegible]
Cotton Canvas	[illegible]
Linen Canvas, No. 1	[illegible]
Seconds, City No. 1	[illegible]
Seconds, City No. 2	[illegible]
Colors, per cwt	[illegible]
Manila Rope	[illegible]
Manila Rope, Tarred	[illegible]
Gunny Bagging, No. 1	[illegible]
Gunny Bagging, No. 2	[illegible]
Kentucky Bagging	[illegible]
Burlap Bagging, No. 1	[illegible]
Tar Shakings	[illegible]
Hemp Twine Stock	[illegible]
Hard White Shavings, No. 1	[illegible]
Soft White Shavings, No. 1	[illegible]
White Shavings, No. 2, soft	[illegible]
Mixed shavings, part white	[illegible]
Ledger and Writing	[illegible]
Solid Stock	[illegible]
Book Stock, No. 1, light	[illegible]
Old Newspapers	[illegible]
Pure Manilas	[illegible]
Bogus Manilas and hardwares	[illegible]
Commons per 100 lbs	[illegible]
Binders' Board Cuttings	[illegible]
Straw Board Cuttings per cwt	70 @ 75

Paints, Oils, &c.

Paints.

Black Lamp, Coach Painters	℔ 22 @ 24c
Black Lamp, Ordinary	[illegible]
Black Ivory Drop, fair	12 @ 15c
Black Ivory Drop, best	[illegible]
Black Paint, in oil	kegs 8c; ass't'd cans, 11c
Blue Prussian, fair to best	[illegible]
Blue Prussian, fair to best, in oil	[illegible]
Blue Chinese dry	[illegible]
Blue Ultramarine	[illegible]
Brown, Spanish	[illegible]
Brown, Van Dyke	[illegible]
Green, Chrome	[illegible]
Green, Chrome, in oil	[illegible]
Green, Paris	[illegible]
Green, Paris, in oil	[illegible]
Iron Paint, Bright Red	[illegible]
Iron Paint, Brown	[illegible]
Iron Paint, Purple	[illegible]
Iron Paint, Ground in oil, Bright Red	[illegible]
Iron Paint, Ground in oil, Red	[illegible]
Iron Paint, Ground in oil, Brown	[illegible]
Iron Paint, Ground in oil, Purple	[illegible]
Mineral Paints	[illegible]
Orange Mineral	[illegible]
Red Lead, American	[illegible]
Red Venetian (Eng.) dry	[illegible]
Red Venetian, in oil	ass't'd cans, 11c; kegs, 8c
Red Indian dry	[illegible]
Rose Pink	[illegible]
Sienna, American, Raw, powdered	[illegible]
Sienna, Burnt, powdered	[illegible]
Sienna, Burnt, in oil	[illegible]
Sienna, Raw	[illegible]
Umber, Burnt, powdered	[illegible]
Umber, Burnt, in oil	[illegible]
Umber, Raw, powdered	[illegible]
Umber, Raw, in oil	[illegible]
Vermilion, Chinese	[illegible]
Vermilion, English	[illegible]
Vermilion, American, Common	[illegible]
White Lead, American, pure dry	[illegible]
White Lead, American, pure in oil	[illegible]
White, Paris, English, prime	[illegible]
Yellow Ochre, French	[illegible]
Yellow Ochre, French, in oil	[illegible]
Yellow Ochre, Vermont	[illegible]
Yellow Chrome	[illegible]
Yellow Chrome, in oil	[illegible]
Zinc White, American No. 1, dry	[illegible]
Zinc White, American No. 1, in oil	[illegible]
Zinc White, French (Paris) dry	[illegible]
Zinc White, French, in oil	[illegible]

Oils.

Linseed Raw, in casks and bbls	[illegible]
Linseed, Boiled, in casks and bbls	[illegible]
Linseed, Calcutta	[illegible]
Bleached Whale	[illegible]
Bleached Sperm	[illegible]
Bleached Elephant	[illegible]
Sperm	[illegible]
Prime Lard	[illegible]
No. 1 Extra	[illegible]
West Virginia	[illegible]
Drilling	[illegible]
Miners' Oil	[illegible]
Fish Oil, pressed	[illegible]
Neatsfoot	[illegible]
Tallow	[illegible]
Empire Cylinder Oil	[illegible]
Machinery	[illegible]
Engine	[illegible]

Sundries.

Asphaltum Cuban	[illegible]
Asphaltum Egyptian	[illegible]
Benzine	[illegible]
Chalk	[illegible]
Chalk, Block	[illegible]

Dryers Patent Am'n	ass't cans, &c; keg 7c
Frostings	4.0
Glue, White	21 @ 31c
Glue, Sheet	20c
Glaziers' Points, Zinc	8c
Gum, Copal	36c
Gum, Damar	26c
Gum Shellac, English	40c
Gum Shellac, English, dark	35c
Litharge	7¼c
Mineral Wool, ordinary	℔ 1 @ 1¼c
Mineral Wool, extra	℔ 3 @ 3¼c
Pumice Stone, selected Lumps	4½c
Pumice Stone, Powdered	2½c
Pine Tar, bbls	$2.75
Pitch	$1.85
Putty, in bladders	3½c
Putty, in bulk	2½c
Rosin—Common and Good—Strained	$1.90
E & F	$2.10 @ $2.20
G & H	$2.30 @ $2.40
I & K	$2.60 @ $2.80
M & N	$3.00 @ $3.25
Spirits Turpentine	40 @ 41c
Whiting Spanish	[illegible]
Waste, No. 1 Cop	10c
Waste, No. 1 White Machine	10c
Waste, No. 2 White Machine	9½c
Waste, No. 1 Colored	7c
Waste, No. 2 Colored	6½c
Waste Washed Machine	5c

Glass.

Prices current per box of 50 feet.
List, July 1, 1883.

Single.

SIZES.	1st.	2d.	3d.	4th.
6 x 8 to 10 x 15	$13.50	$11.50	$10.75	$10.25
11 x 14 to 16 x 24	14.50	13.50	12.60	11.50
18 x 22 to 20 x 30	18.50	17.00	15.50	14.00
15 x 36 to 24 x 30	20.50	18.50	16.25	
26 x 28 to 24 x 36	22.00	20.00	17.50	
26 x 36 to 26 x 44	24.00	22.00	18.50	
26 x 36 to 30 x 50	26.00	24.00	20.50	
30 x 52 to 30 x 54	27.00	25.00	21.50	
30 x 54 to 34 x 56	29.00	27.00	24.00	
34 x 58 to 34 x 60	31.00	29.00	26.00	
36 x 60 to 40 x 60	35.00	31.00	29.00	

Double.

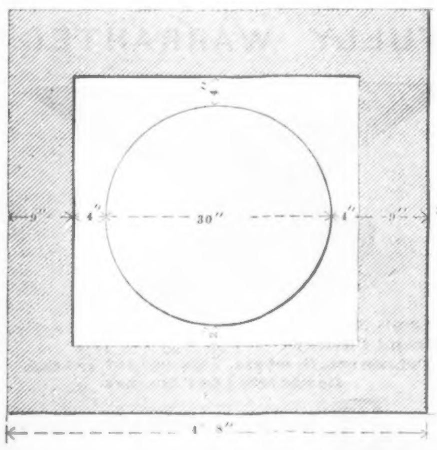
SIZES.	1st.	2d.	3d.	4th.
6 x 8 to 10 x 15	$17.50	$15.00	$14.00	$13.00
11 x 14 to 16 x 24	20.00	18.00	16.50	
18 x 22 to 20 x 30	24.00	22.00	20.00	
15 x 36 to 24 x 30	26.50	23.50	21.00	
26 x 28 to 24 x 36	29.00	26.00	23.00	
26 x 36 to 26 x 44	30.00	28.00	24.00	
26 x 36 to 30 x 50	33.00	31.00	27.00	
30 x 52 to 30 x 54	35.00	32.00	28.00	
30 x 54 to 34 x 56	37.00	34.00	30.00	
34 x 58 to 34 x 60	40.00	37.00	33.00	
36 x 60 to 40 x 60	43.00	40.00	37.00	

Sizes above—$15 per box extra for every 4 inch increase. An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 84 united inches, will be charged in the united 84 inches bracket. Discount, 70 and 10.

Mechanical Construction.

Mr. Coleman Sellers, of Philadelphia, recently delivered a lecture before the Pennsylvania Museum and School of Industrial Art in that city on the above subject, and as we think it will be of interest to our readers generally, we give it here almost entire:

It is not often that laymen have an opportunity to talk about teaching to those who make an occupation of it. At the same time, an expression of opinion from a layman may sometimes afford suggestions which may be developed by those who are better fitted to grapple with the subject. I do not think, from what I know of modern teaching, that it differs very much from what it was when I was a boy. I do know this, however—that when



Mechanical Construction.—Fig. 1.—Plan of Vertical Boiler, with Square Brick Casing.

pupils from the public schools come to our machine shops, we find that they have a lack of some kinds of information, and a superabundance of other kinds of information, if there can be too much of any. They have been educated to make good tradesmen and dealers, but not good mechanics. The mercantile element in every branch of business is a very important element, for the mechanic must be a good merchant, too, in order to make his business prosper; but if there could be such an arrangement of the studies as to give the pupils some knowledge of what would be of use to them in the shops, we would be better satisfied. We would like the young man who comes into the workshop to feel that the mathematical knowledge which enables him to combine different grades of sugars or teas, so as to produce a mixture of a required value, would also find an application in calculating the proportions of the component parts of machines, and that the same rules, if you choose to call them rules, are of use in calculating the relative speeds of machines and computing strength of parts. If their examples had been so selected they would not seem to be so helpless when they came to the workshops.

There has lately been published a book that I would advise you all to read. It is called "The Autobiography of James Nasmyth," who is a Scotchman, the son of a portrait painter of note, and who became, almost unaided, one of the eminent mechanical engineers of modern times. He invented the steam hammer and many of the modern machine tools, such as those which are manufactured by the firm with which I am connected. He invented many labor-saving machines, and at a comparatively early age, about 48, retired with a competency, and devotes his time to science with such success that he also is known as an astronomer of considerable merit. He has given us, in a

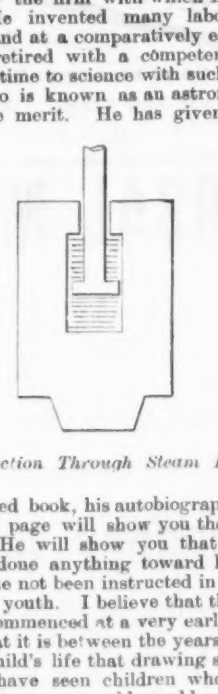


Fig. 2.—Section Through Steam Hammer.

well-arranged book, his autobiography. Almost every page will show you the need of drawing. He will show you that he could not have done anything toward his great work had he not been instructed in drawing in his early youth. I believe that this study should be commenced at a very early age. I conceive that it is between the years one and two of a child's life that drawing should be begun. I have seen children who, before they were two years old, could say with a pencil more than they could say with words. This is not an exaggeration. The natural instinct of every child is to draw; all are fond of pictures; a child's nature is to take in information from surrounding objects, and when he has got it, he can make use of it. The study of drawing cannot be begun too early.

It will probably be best, in order to make this matter perfectly clear to you, to show you to some extent what are the requirements of drawing in a machine shop. You must bear in mind that everything that is constructed must have a drawing made of it before it can be made. There are various kinds of drawings, and they may be classified as representative, constructive and decorative. Representative drawing, which treats of objects as they appear, is the kind of drawing that a child begins with. It may also be called pictorial. It is not at all possible to make a machine from drawings that merely show the outside. Drawings for machines have to show the dimensions of every part, and drawings made for this purpose are called constructive drawings. They show the contour of objects, and that contour is indicated only by an outline. The whole surface is often covered over with lines and figures indicating dimensions, and the drawing does not present a picture of the machine, but rather seems to the uninitiated like a meaningless jumble of lines. The mechanic must know something of how to make drawings in order to know how to read them. The general inability to understand drawing is often illustrated thus: You make a carefully constructed drawing or plan of something which you wish to have made—something quite simple, we will suppose. You carry that drawing to an ordinary handicraftsman, who may be an excellent workman. He will probably look at the drawing, hesitate, and finally ask you to show him what it means.

Not long ago I had a vertical boiler to set in my cellar; it was 30 inches in diameter. I wished to have a wall built around the boiler. Say this is the boiler (illustrating, Fig. 1). I wanted a 4-inch space between the boiler and the 9-inch wall, a less space in front and 4 inches behind. So simple a plan as this which is here drawn was submitted to a good bricklayer. He examined it, and finally confessed that he could not understand it. I had given him the outside dimensions of all the parts of it. Finally I had to take sticks and lay them together on the ground, and told him to build the brickwork up to these sticks and he would be all right. This man had received his education in the public schools of Philadelphia before they taught drawing. He was not an ignorant man, by any means, but he could not understand how a drawing, 1 foot square, could represent what was to be 5 feet square. When drawing comes to be taught generally in the public schools, you will find that there are many ways of making the subject interesting; you will find it the best means of conveying many kinds of instruction. As soon as a boy comes from the schools and passes into the drawing office of the shops, he is surprised that the rules of arithmetic are not used—at least not to the extent that he thought they might be; but he soon grasps the idea that arithmetic may be used in a different manner. He is made to feel that facts must be understood, and not learned by rote. He learns that the "Rule of Three" need not be done by figures altogether, but may be worked out by a combination of straight lines, and by means of this graphical process he finds that he can calculate much more rapidly than he could by figures. In other words, he is taught to scale his various problems.

To leave this part of the subject, we will proceed at once to the requirements of the mechanical draftsman (showing a large mechanical drawing). This is a drawing of a steam hammer, which was intended to be engraved. I have brought this because you can see it more plainly than a working drawing. This is only a front elevation, as it is called. It represents a machine as you would see it on one side, but not in perspective. You are looking at the face of it. All drawings for machines are made in that manner. After they are so made it is customary to trace them, the tracings being made on cloth such as this (showing an ordinary tracing). Formerly these tracings were sent to the workshop for the men to work to, but that has been generally abandoned, now owing to the use of what is called the blue process. Sheets of paper coated with a chemical substance are placed under the tracing and then covered by a sheet of glass. It is exposed to the sunlight. The light passes through the thin paper or the thin tracing cloth upon which the drawing is made, and falls upon the prepared surface of the paper. Wherever the light strikes a chemical change takes place, and where the light does not pass through there is no change. Where the light has touched the paper the chemicals becomes insoluble in water. These sheets are then washed off in pure water, and the effect is produced of white lines upon a blue ground.

I have here a blue print, which will give you some idea of the intricacy of mechanical drawings. It is covered with writing and with figures. Every part of a machine to be constructed is carefully mapped out. It will not do to trust to measurements of the drawing, but all the parts are marked with their dimensions in inches and fractions of inches, going as high as four decimals in cases where such nicety is required.

A boy comes to the workshop with no knowledge of how to draw. The first thing we give him to do, if he is to learn to be a draftsman, is to have him place a sheet of this translucent paper over a drawing and tell him to trace the lines underneath it, and so for many weeks he is kept at making tracings. During that time he has learned the use of instruments and has learned the parts of machines. He is gradually becoming familiar with what he looks at, and begins to discern in the confusion of lines the true forms of the objects which are represented. So he is learning to talk before he learns grammar. He learns to draw before a single one of the rules of drawing is taught to him in any way or shape. That is the way drawing must be taught to be taught successfully. If he wishes to be more than a mere draftsman, he must have a certain facility at free-hand sketching; he must learn to make drawings by his pencil unaided by his instruments. Such drawings, however, are not working drawings. A constructive drawing should not have any free-hand work. It must be done by the aid of squares, compasses or curves. Still, it is necessary for him to know how to sketch, for the knowledge is of inestimable importance, and it marks the place where the man ceases to be a mere "hand" and becomes a head. He is then enabled to impart knowledge as well as absorb it.

It has been said that a man may go into a country where he does not understand one word of the language, and pass everywhere with ease if he will carry a sketch-book and pencil with him, and knows how to use them well, for he can resort to the universal language of the pencil and talk to every person in a manner that he can understand. There is a story told of a painter sketching in a certain part of Wales where English was but little understood. He became very hungry, and stopping at a house, he made up his mind that he would like to have a cup of tea to drink, and he found that the best way to explain it was to draw a tea-cup with a spoon put in it. This little sketch would certainly enable him to give the lady an idea of what he wanted. (Mr. Coleman Sellers, Jr., drew rapidly upon the blackboard the illustration described by the speaker) In this case he wanted some eggs also, and would like to have the eggs fried; so he gave the idea of a pan where the cooking was to be done as a preliminary to the intimation that he wanted some eggs, and having drawn the eggs, for fear that they might be mistaken for potatoes, he supplemented it by a drawing representing the fowl from which the egg was derived. It might not possibly have been an exact representation, but it gave an idea of what was intended.

Mr. Nasmyth, in his very interesting book, tells a still better story. He said that when he was traveling in Sweden he stopped at a country inn where no one could speak English. He wanted to make them understand that he wished something to eat, so he carried out the graphical method still further than this, and he gives us a picture of what he wanted to obtain. This illustration now upon the blackboard will tell its own story, and Mr. Nasmyth had no difficulty in getting exactly what he wanted. (Mr. Sellers, Jr., drew a picture of a roast chicken upon a platter, with knife and fork, a bottle and a tumbler, corkscrew, loaf of bread, &c.) Mr. Nasmyth tells us that in the course of his early instruction under his father, the old gentleman was in the habit of throwing a pile of bricks, or blocks that would represent bricks, in such a way that there was seemingly no order among them, and then would tell his son to make a sketch of them. He would make the picture, at first not so readily, but afterward with better success, and his father used to tell him that anybody who could make a picture of a pile of bricks could make a drawing of any of the greatest buildings of England without any trouble at all. The ease of acquiring such facility is much greater than most persons would imagine, but the earlier in life this art is acquired, the easier it is learned. A child who learns to draw is not so much hampered by a knowledge of the shapes of things. I have tried this experiment upon laboring men upon the railroad. I asked one of them if the track didn't seem to come together in the distance; if the two rails didn't appear to meet, and he said "No, sir." A child would have said, "Yes." The man, however, knew that the rails did not come together, because he laid them, and it did not impress him that they did appear in perspective to come together. Again, take the same person out to see the setting sun, and let him see the light streaming in through the clouds in seemingly divergent paths, and ask him if he thinks those rays are parallel, and he will say that they are not. It would, however, be difficult to make him understand that they are parallel. You can show him that all the rays of sun that strike the earth are practically parallel lines, and that they are precisely the same in perspective as a railroad track. Now, the child does not know these things. The child, in looking at the railroad track, will more readily say that the rails do seem to come together, and in drawing a railroad track, he would draw the two rails in that way.

When the Pennsylvania Museum first opened its drawing school, I examined a great many of the pictures that were brought there as specimens of work by those who wished to enter. They were almost all made from the flat—that is, they were copied from other drawings. Every one was required to draw some object which we placed before him. That object was a figure made up of certain bars of wood painted white. In nearly every case the pupils endeavored to represent that object on all sides of it, as though it was spread out. They knew that it was square, and so they reached off in every direction to figure it. They were allowing their knowledge of the actual shape of the thing to interfere with their drawing of that which is really impressed upon the eye. It requires one to have a good deal of control over his reason to make him come to that point when he can draw or paint a thing as it is, and not as his reason tells him it ought to be. In nine cases out of ten, when a person attempts to paint a landscape for the first time he will paint the leaves of the trees in the distance green, although they do not appear green to the eye, and it can be proved that they are not green; but when a picture is properly painted, the same person, in looking at it, will say these trees appear to be green in the distance, when not a single particle of green has been used in painting them

In teaching the art of drawing, the earlier you begin with a child in free-hand sketching the more easily he will attain facility in doing it. Let us now consider the function of drawing in the development of an invention. Everything must first be conceived in the mind of the person who is inventing it. Legitimate invention consists in filling wants. A man requires something to be done. He either plans some way to do it himself, or he applies to some one skilled in the art to scheme it out for him. Mr. Nasmyth has given us, in his book, the exact process of inventing the steam hammer. I cannot take a better example than this: The Great Western steamship had been built, and it had crossed the ocean and proved a success, and another steamer like it, the Great Britain, was to follow. But the gentleman who had charge of the manufacture of the Great Britain, Mr. Francis Humphreys, an engineer, met with an unexpected difficulty. They required a shaft 30 inches in diameter to pass across the ship, to carry the paddle wheels. He asked for bids for this from all the different forges in Scotland, but they all replied that they had no facilities for forging such a piece of wrought iron. The reason they could not forge it was that the helve hammers then in use were not large enough, nor could they be practically increased in size The helve hammer of those days was a large mass of iron, rocking on a foot at one end of its length, and underneath it was a revolving set of cams, which lifted the massive head at the other end of the helve and allowed it to fall through an arc upon the anvil. Mr. Humphreys wrote to Mr. Nasmyth, stating his difficulties, and asked if cast iron could be substituted for wrought iron in this shaft, and he (Mr. Nasmyth) at once conceived the idea of how to accomplish the result desired. Mr. Nasmyth reasoned thus: The iron must be forged between two dies, one of which should move vertically. The trouble with the helve hammer is that it does not rise high enough. In the ideal hammer the upper die must move up vertically, and what is easier than to make the hammer slide up and down vertically in guides? Next, how shall it be lifted? There are many ways of picking it up; probably the best way would be to put a rod at the top, passing into a steam cylinder, and so raise the weight by steam directly, and when the steam is withdrawn from under it, it will fall. He made at first a rough sketch, which has been preserved, and then a second sketch on the same page, which is really a fair representation of the steam hammer that is now known all over the world by Mr. Nasmyth's name.

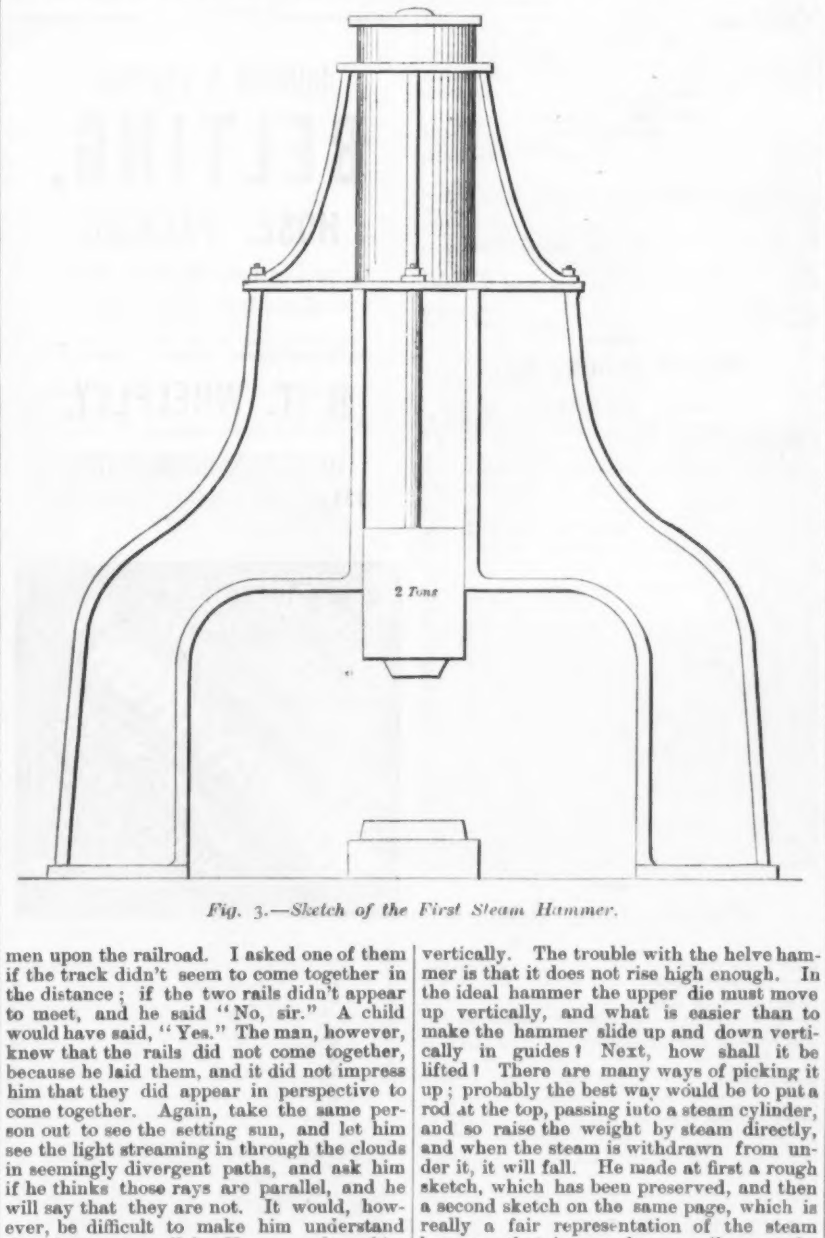


Fig. 3.—Sketch of the First Steam Hammer.

I will give you a little idea of what it is. (Here Mr. Sellers drew the outline of the steam hammer, using both hands at the same time, Fig. 3). Here we have two frames. There is a weight sliding in between these two frames. This weight is marked two tons. From the top of this weight there is an iron rod passing from the center of the weight up into a steam cylinder, and we will make dotted lines in the cylinder to indicate the bore. In the cylinder he places what is called a piston, which is connected with this rod, and this square place represents the valve-chest containing the valve, and a rod from that is run down to the workman, who stands at the working-lever on the outside, and he, by moving the lever up and down, actuates the valve and lets steam underneath the piston or opens the exhaust. I have described the process by which the invention of the steam-hammer was accomplished, and it may be taken as a fair example of the way in which, at the proper time, inventions are generally made. The difficulties arise, and the means to overcome them are produced.

When a drawing like this is to be made (showing a drawing), various calculations have to be gone through with. Let me explain. On the original paper showing Mr. Nasmyth's invention you will find little notes. On the supposition that the falling weight is two tons—that is, twice 2240 pounds (in America it would be twice 2000 pounds)—he divides 4480 pounds by what he thinks is the pressure that the steam would work best at. There he must use his judgment. He divides it by, say, 15, because he imagines that 15 pounds to the square inch would be a good pressure to move it quickly. Then he finds the number of square inches of area of the cylinder. He then has as a starting point the fact that a cylinder of a certain diameter will lift the given weight if the steam pressure is so many pounds per inch.

It occurs to my mind at this moment that a few words about areas of circles will be of use. We are taught at school we must square the diameter—that is, we must multiply the diameter by itself, and then multiply the product by the decimal .7854. This rule is ground into everybody's mind who has to use it all the time; I learned it at school, but I was a man grown when the reason why this is done suddenly burst upon my mind. It was an arbitrary rule for me to work to, and I learned it by rote. In practice we use tables, such as circumference or area tables, square-root tables and other tables with which our books are filled, without probably having any idea of how they are constructed. By looking at such a table in a book, I saw that a circle 1 inch in diameter has an area of .7854. In other words, the diameter 1 inch, multiplied by 1 inch, is 1 square inch, and a circle 1 inch in diameter will have an area of .7854, and a square having for its side the same length as the diameter of a circle will always bear the same relation to that circle as the ratio between 1 and .7854. How this was found out we need not care—some mathematician worked it out—but it is a good thing to get into your head, no matter how it comes. It is information that sticks to you all the time; you never lose it. As soon as you find that you can use it understandingly, it is of use to you. It is utterly impossible for any mind to become interested in geometry, unless geometry has been taught first by constructing the objects to be analyzed. After geometry has been taught by construction—that is, by teaching how a circle is made by the compass, and how it is divided into various angles, how squares are constructed, how angles are made, and how everything that is to be used afterward in geometry is formed upon the paper—the next thing to do is to apply the geometrical argument to these things, and the subject becomes intensely interesting. I remember perfectly well that when I was a pupil there was no subject that interested me so much as geometry. I asked permission to be separated from my class in geometry, because I did not get along fast enough. I do not remember having to read a proposition a second time. I knew what these figures all meant, and it was a pleasure to me to argue out the relations of their parts, one to another.

To return to our subject, a drawing such as that of the hammer which I have described to you is called a "design." Calculations have to be made of the strength of the parts in order to ascertain their sizes. This hammer in falling may not always hit immediately in the center of the object to be struck; sometimes it will strike on one corner, and the huge falling block will whip over to one side. So the mechanical engineer must proportion his machine to stand this strain, and others of like character, and then add something for margin after that. When this steam hammer was first built no end of trouble was experienced with the little rod that lifted the weight up. It broke all the time, and they were quite puzzled to know how to remedy this defect in it. Mr. Nasymth told them that they had not examined his sketch carefully; if they had done so they would have seen that when the piston-rod passed down into the big block or hammer head it entered a chamber, and a head on the lower end of the rod was surrounded by elastic material, leather or something similar, to relieve the strain of the blow. His judgment showed him that here would be such a difficulty, and he had indicated that elastic substance in his original sketch, but it had not been observed. How Mr. Nasmyth got his information as to the need of elasticity, it is rather difficult to explain; but I think that all practical information of that kind is obtained by contact with material that you have to work with. He calls the science of engineering "common sense applied to material," and I think in that expression we see what was the main spring of his success. The engineer requires a knowledge of material; he requires a knowledge of all the different kinds of wood, iron or other materials that he may have occasion to work with. There is no limit to the amount of knowledge that the mechanical engineer will find of use to him. He applies the law of common sense to material, and constructs machines that perform more work and better than man's hand can do.

One thing that Mr. Nasmyth says struck me as very good indeed. "All information comes to us, not only through the eyes, but also through the tips of the bare fingers." He said that, although he had noticed a great many engineers that were addicted to wearing kid gloves, yet he could assure them that there was nothing more non-conducting to practical information than kid gloves. If he had added parting the hair in the middle, it would have been an additional description of an engineer of the non-absorbent kind. A boy that goes into a machine shop has got to go through a very rough school before coming out an engineer; but if he goes in with a knowledge of drawing, and that only, he will make better progress. I do not say that trades must be taught in the public schools; I am utterly opposed to that, but I want the education of the public-school children to be in the direction of something to do, and not merely something to know. The principles that underlie the trades can be reduced to a common basis, and if the boy or girl is taught to use his or her fingers by using a pencil, he or she will be ready to do more difficult work, because they have learned that delicate touch that only comes through the use of the pencil or its equivalent. Too much stress cannot be laid upon drawing.

I have told you that drawing has been called the universal language, and I may add that it can be used to convey false ideas. I am going to illustrate that by a little anecdote. Some years ago I was attending in Boston the meeting of the Society of Railway Master Mechanics. An excur-

(*Continued on Page* 34.)

New York Wholesale Prices, August 15, 1883.

(For Wholesale Metal Prices See Page 29.)

HARDWARE.

Anvils.

Eagle Anvils American....₩ lb 10c—dis 20 %
Wright's....11c @ 11 1/4c
Armitage's Mouse Hole....9 1/2c @ 9 3/4c
Armitage's Mouse Hole (extra quality)....11 1/4
Trenton....10 1/2c
Wilkinson's....10 1/2c

Anvil Vise and Drill.

Millers Falls Co., $18.00....dis 20 %
Cheney Anvil and Vise....dis 33 1/3 %

Augers and Bits.

Conn. Valley Mfg. Co.
Douglass Mfg. Co.
C. E. Jennings & Co.
Humphreysville Mfg. Co.
Ives
Beecher (French, Swift & Co.
Griswold
Nobles Mfg. Co.
Snell Mfg. } dis 50&25 % from list of Jan. 7, 1880.
Watrous & Co. Extension Lip....dis 35 %
Cook's Douglass Mfg. Co....dis 40&10 %
Patent Solid Head....dis 30 %
Lewis' Patent Single Twist....dis 45 %
Russell Jennings' Auger, Dowel, Machine-Dowel and Hand Rail bits....dis 10&10&10 %
Russell Jennings' Augers....dis 10&5&10&10 %
Russell Jennings' Car and Machine Bits, Boring-Machine and Millwrights' Augers....dis 25&10&10&10 %
Imitation Jennings' Bits....dis 50 %
Ives' "Jennings'" Bits....dis 45&10 %
Snell Mfg. Co.'s Jennings' Bits....dis 40&10 %
Expansive Bits, Clark's, small, $18; large, $26....dis 25 %
Expansive Bits, Ives'....$20 @ $30—dis 33 1/3&10 %
Expansive Bits, Blake's....$20—dis 40 %
Expansive Bits, Derby, $17 and $26....dis 40 %
Hollow Augers, Ives
Hollow Augers, French, Swift & Co. } dis 25 %
Hollow Augers, Douglass'....25 %
Hollow Augers, Bonney's Adjust. ₩ dz. $48—dis 20&10 %
Hollow Augers, Stearns' Adjust. ₩ dz. $48—dis 20&10 %
Hollow Augers, Ives' Expansive, each $4.50—dis 30&10 %
Hollow Augers, Universal Expan., each $4.50—dis 30&10 %
Wood's....dis 25 %
Gimlet Bits....$7.50 ₩ gross, dis 10 %
Gimlet Bits, Diamond....₩ doz. $1.10, dis 25&10 %
Gimlet Bits "Bee"....dis 25 %
Double Cut Gimlet Bits, Shepardson's....dis 45 %
Double Cut Gimlet Bits, Ct. Valley Mfg. Co. dis 40&10 %
Double Cut Gimlet Bits, Hartwell's....dis 60 %
Double Cut Gimlet Bits, Douglass'....dis 40&10 %
Double Cut Gimlet Bits, Ives'....dis 40&10 %
Morse's Bit Stock Drill....dis 25&10 %
Holtz Bit Stock Drills....dis 25&10 %
L'Hommedieu's Ship Augers....dis 15 %

Awl Hafts.

Sewing, Brass Ferrule....$3.50 ₩ gross—dis 40&10 %
Patent Sewing, Short....$1.00 ₩ doz.—dis 40&10 %
Patent Sewing, Long....$1.20 ₩ doz.—net
Patent Peg, Plain Top....$10.00 ₩ gross—dis 40&10 %
Patent Peg, Leather Top....$12.00 ₩ gross—dis 40&10 %

Awls, Brad Sets, &c.

Awls, Sewing, Common....₩ gross $1.70—dis 25&10 %
Awls, Shouldered Peg....₩ gross $2.45—dis 25&10 %
Awls, Patent Peg....₩ gross 60c—dis 25&10 %
Awls, Shouldered Brad....₩ gross $2.70—dis 25&10 %
Awls, Handled Brad....$7.50 ₩ gross—dis 25&10 %
Awls, Handled Scratch....$7.50 ₩ gross—dis 25&10 %
Awls, Socket Scratch....$1.50 ₩ gross—dis 25&10 %
Brad Sets, Aiken's....₩ doz $10.00—dis 50&10 %
Millers Falls Adj. Tool Hdles....₩ doz $12—dis 25 %
Brad Sets, No. 42, $10.50; No. 43, $12.50....dis 70&10 %
Brad Sets, Stanley's Excelsior, No. 1, $9.60....dis 30&10 %
Brad Sets, Stanley's Excelsior, No. 2, $1.80....dis 30&10 %
Brad Sets, Stanley's Excelsior, No. 3, $7.80....dis 30&10 %

Axes.

Single Bit, 4 1/2 to 5 1/2 and under....₩ doz $8.00 net
Single Bit, 4 1/2 to 6 and over....₩ doz $8.50 net
Single Bit, beveled....50c ₩ doz advance
Double Bit, 4 1/2 to 5 1/2 and under....₩ doz $15.00 net
Double Bit, 4 1/2 to 6 and over....₩ doz $16.00 net
Double Bit, beveled....$1.00 ₩ doz advance

Axle Grease.

Frazer's....₩ lb 8c

Axles.

Standard list....dis 45 %

Balances.

Spring Balances....dis 33 1/3 %

Bells.

Hand, Light Brass....dis 70 %
Hand, Extra Heavy....dis 60 %
Hand, White Metal....dis 70 %
Hand, Silver Chime....dis 25&10 %
Hand, Globe (Cone's Patent)....dis 20&10 %
Gong, Abbe's....dis 20&10 %
Gong, Yankee....dis 30&10 %
Gong, Barton's....dis 30&10 %
Crank, Taylor's....dis 50&10 %
Crank, Brooks'....dis 50&10&2 %
Crank, Cone's....dis 10 %
Crank, Connel's....dis 10 %
Lever, Sargent's....dis 15&10 %
Lever, Taylor's Bronzed or Plated....net
Lever, Taylor's Japanned....dis 25&10 %
Lever, R. & E. M. Co.'s....dis 50&10&2 %
Lever, Reading....dis 25&10&10 %
Pull, Brook's....dis 25&10 %
Pull, Western....dis 25 %
Call....dis 25&10 %
Cow, Common Wrought....dis 55&10 %
Cow, Western....dis 55&10 %
Cow, Western, Sargent's new list....dis 60&10 %
Cow, Kentucky "Star"....dis 50&10 %
Cow, Kentucky Sargent's new list....dis 60&10&10 %
Cow, Dodge' Genuine Kentucky, new list—
Nos. 0 1 1 1/2 4 5 6 Hog
$12.00 10.00 9.00 8.00 7.00 5.00 3.40 2.50 5.00 } dis 60 %
Cow, Texas Star....dis 60&10 %

Bellows.

Blacksmiths Common....dis 45 %
Blacksmiths' Extra Pittsburgh Pattern....dis 40 %
Molders'....dis 20 %
Hand Bellows....dis 20 %

Belting, Rubber.

Belting and Packing Co....dis 50 %

Bit Holders.

Extension, Barber's....₩ doz $15.00—dis 40&5 %
Extension, Ives'....₩ doz $15.00—dis 40&10 %
Diagonal....₩ doz $18.00—dis 40&10 %
Angular....₩ doz $24.00—dis 40&10 %

Blind Adjusters.—Domestic....₩ doz $3.00—dis 30 %
Excelsior....₩ doz $16.00—dis 40&10&10 %

Blind Fasteners.

Mackrell's....₩ doz pairs, $1.00 dis 20&10 %
Van Sand's Screw Pattern....$9 ₩ gro. dis 10&25 %
Van Sand's Old Pattern....$9 ₩ gro. dis 25&10 %
Washburn's Old Pattern....$9 ₩ gro. net
Merriman's....new list, net
Salisbury & Austin, No. 2008....$9 per gro. net
Security Gravity....$9 per gross, net

Blind Staples.

Barbed, 1/2 in. and larger....₩ lb 9 3/4c net
Barbed 3/8 in....₩ lb 11 1/2c net

Blocks.

Penfield Block Co., I. R. and I. Strap'd....dis 40 %
Penfield Block Co., W. I. C. bushed....dis 40 %
Penfield Block Co., W. I. all steel roll'r....dis 40 %
Penfield Block Co., L. & I. Sheaves....dis 40 % } New List.
Stanley Rule & Level Co.'s....dis 40&10 %

Bolts.

Cast Iron Barrel Shutter, &c....dis 50&10 %
Cast Iron Chain (Sargent's list)....dis 60&10 %
Ives' Patent Door Bolts....dis 60&10 %
Wrought Barrel....dis 55&10 %
Wrought Square....dis 55&10 %
Wrought Shutter, all Iron, Stanley's list....dis 60&10 %
Wrought Shutter, Brass Knob, Stanley's list dis 60&10 %
Wrought Shutter, Sargent's list....dis 60&10 %
Wrought Sunk Flush, Sargent's....dis 60&10 %
Wrought Sunk Flush, Stanley's....dis 60&10 %
Wrought B. K. Flush, Com'n Stanley's....dis 55&2 %
Carriage and Tire Common....dis 65&10 %
Carriage and Tire, Philadelphia, new list....dis 70 %
Carriage and Tire, Philadelphia Pattern....dis 70 %
Union Carriage....dis 70 %
R. B. & W. Carriage (old list)....dis 70 %
Tire, Am. Screw Co.'s, Phila., new list, July 2 1883....dis 80 %
Tire, "Bay State," new list, July 2, 1883....dis 80 %
Tire, R. B. & W., new list....dis 75&10 %
Stove—American Screw Co.'s....dis 40 %
Stove, R. B. & W....dis 40 %
Stove, R. & E. Mfg. Co....dis 40 %
Plow....dis 40 %
Plow, R. B. & Co....dis 40 %
Machine....dis 40 %
Bolt Ends....dis 40 %

Borax.....₩ lb 15c

Boring Machines. Upright Angular
First quality, no Augers....$6.50 $6.75 dis 40@50 %
Phillips, with Augers....7.00 7.75....net
Jennings & Co., no Augers....5.00 5.75....dis 30 %
Saunders' Patent, Regular Bed, $6.00....dis 30 %
Saunders' Patent, Extra Bed, $6.50....dis 30 %

Boxes.

Interchangeable Shelf Boxes....dis 30 %

Braces.

Q. S. Backus....dis 50 %
Barber's....dis 50 %
Spofford's Patent....dis 50 %
Ives' Patent Braces....dis 50 %
Common Ball (American)....dis 50 %
Amidon's....dis 50 %
Backer's Imp'd....dis 40 %
Empire....dis 35 %
Buffalo Ball....dis 35 %

Brackets.

Shelf, plain....dis 50&10 %
Shelf, fancy....dis 50&10 %
Reading, Plain....dis 60&10 %
Reading, Rosette....dis 60&10 %
List of June 25, '83....dis 70&10 & —%
Union....
Sargent's....dis 66 2/3&10 %
Hotchkiss' low list....dis 66 2/3&10 %
Humason, Beckley & Co's....dis 66 2/3&10 %
Peck, Stow & W. Co's....dis 33 1/3&10 %

Butts.

Wrought Brass....dis 50&10 %
Cast Brass, Tho...'s....dis 33 1/3 %
Cast Brass, Corbin's Fast Joint....dis 45&10 %
Cast Brass, Loose Joint....dis 10&10 %
Fast Joint Narrow....dis 45&10&10 %
Fast Joint, Broad....dis 45&10&10 %
Loose Joint....dis 55&10&10 %
Loose Joint, Japanned....dis 55&10&10 %
Loose Joint, Japanned with Acorns....dis 55&10&10 %
Parliament Butts....dis 55&10&10 %
Mayer's Hinges....dis 60&10&10 %
Loose Pin, no Acorn....dis 55&10&10 %
Loose Pin, Acorns....dis 55&10&10 %
Loose Pin, Acorns, Japanned....dis 60&10&10 %
Loose Pin, Acorns, Japanned, Plated Tips. dis 60&10&10 %

WROUGHT IRON.

Fast Joint, Narrow....dis 50&10 %
Fast Joint, Lt. Narrow....dis 50&10 %
Fast Joint, Broad....dis 50&10 %
Loose Joint, Broad....dis 55&10 %
Table Butts, Back Flaps, &c....dis 50&10 %
Inside Blind Regular....dis 50&10 %
Inside Blind, Light....dis 50&10 %
Loose Pin, Wrt....dis 55&10 %
Loose Pin, Light....dis 50&10 %
Spring Hinges:
Geer's Spring and Blank Butts....dis 25 %
Sabin Mfg. Co.'s Double Acting....dis 35 %
Union Spiral Spring, Japanned....dis 25 %
Union Spring Hinge Co.'s....dis 25 %
American Spring Hinge Co.'s....dis 30 %
Gem Spring Hinges....dis 30 %
Barker's Double Acting....dis 20 %
Union Mfg. Co....dis 25 %
Bommer's....dis 25 %
Buckman's....dis 25 %
Empire....dis 50&10 %
Acme....dis 65&10 %
Climax....dis 50&10 %
Blind Butts, Parker....dis 70&2 %
Blind Butts, Palmer....dis 50&10 %
Blind Butts, Seymour....dis 70 %
Blind Butts, Lull & Porter....dis 75&10 %
Blind Butts, Nicholson....dis 45&10 %
Blind Butts, Huffer....dis 60 %
Blind Butts, Clark's, Nos. 1, 3, 5....dis 70&2 %
Blind Butts, Sargent's, Nos. 1, 3....dis 66 2/3&10 %
Blind Butts, Sargent's, No. 12....dis 70&10 %
Blind Butts, Reading's Gravity....dis 66 2/3&10 %
Blind Butts, Shepard's "Noiseless," Nos. 50, 60, 65, 45 and 55....dis 70 %
Blind Butts, Shepard's "Noiseless," Nos. 050 and 060....dis 70&10 %
Shepard's Lull & Porter Shutter Hinges....dis 70&10 %
Shepard's Reversible Shutter Hinges....dis 70&10 %
Clark's Improved Shutter Hinge, Nos. 0, 1, 1 1/2, 2, 2 1/2, 3....dis 60&10 %

Bow Pins.

Humason, Beckley & Co.'s, Nos. 1 and 2....dis 60 %
Humason, Beckley & Co.'s other Nos....dis 66 2/3&10 %
Sargent & Co.'s....$19.70 and $21.40, dis 66 2/3&10 %
Hotchkiss....dis 25 %
Peck, Stow & W. Co....dis 30&10 %

Butcher's Cleavers.

Humason & Beckley Mfg. Co....dis 25 %
Bradley's....dis 25 %
Beatty's....dis 25&5 %

1	2	3	4	5	6	7	8
$16.50	19.00	21.50	24.00	27.00	30.00	33.50	36.50

Calipers....see Compasses

Can Openers.—Messenger's Comet, ₩ doz, $3.00....dis 25 %
American....₩ gross $6.00, dis 25@30 %
Duplex....₩ doz 25c, dis 15@20 %
Lyman's....₩ doz $3.75, dis 20 %
No. 4, French....₩ doz $2.25, dis 55 %
No. 5, Iron Handle....₩ gross $9.00, dis 25@30 %
Eureka....₩ doz $2.50, dis 10 %
Sardine Scissors....₩ doz $7.00, dis 55 %
Star....₩ doz $5.00, dis 25&5 %
Sprague, No. 1, $2.00; No. 2, $2.25; No. 3, $2.50....dis 50&10 %
"Worlds Best" ₩ gross, No. 1, $12.00; No. 2, $24.00; No. 3, $30.00....dis 50&10 %
Universal....₩ doz $1.00, dis 35 %
Domestic....₩ doz $2.50, dis 45 %
Champion....₩ doz $2.00, dis 50 %

Caps—Percussion, ₩ 1000.

Hicks & Goldmark's
F. L. Waterproof, 1-10's....50c
E. B. Trimmed Edge, 1-10's....65c
E. B. Ground Edge, Central Fire, 1-10's....70c
Double Waterproof, 1-10's....$1.10
Pistol Waterproof, 1-10's....75c
Musket Waterproof, 1-10's....80c } dis 10&10 %
G. D. & S. B....33c, dis 10 %
U. M. C., F. C. trimmed....50c
U. M. C., F. L. ground....70c } dis 10&10 %
U. M. C., Cen. fire ground....70c
U. M. C., Double W. Proof....$1.40 } dis 10&5 %
Double Waterproof, in 1-10's....$1.40
Colt's Pistol, in 1-10's....75c } dis 10 %
F. L....50c
E. B. 1-10, trimmed....65c
E. B. 1-10, ground edge....70c } dis 10&5 %
Musket, in 1-10's....80c, dis 25 %

Cartridges.—Rim....dis 70 %
Central Fire....dis 45@50 %

Cards.—Horse and Curry, new list, July, '81, dis 10 %
Cotton....new list, July, '81, dis 10 %
Wool....new list, July, '81, dis 10 %

Carpet Stretchers.

Cast Steel, Polished....₩ doz $5.00, dis 30 %
Cast Iron, Steel Points....₩ doz $2.00, dis 20&5 %
Socket....₩ doz $2.50, dis 25 %
Bullard's....dis 25 %

Casters.—Bed....dis 45@50 %
Plate....45@50 %
Shallow Socket....dis 35&10 %
Deep Socket....dis 25&10 %
Martin's Patent (Phoenix)....dis 25 %

Cattle Leaders.

Humason, Beckley & Co.'s....dis 70&10 %
Sargent's....dis 70&10 %
Hotchkiss....dis 25 %
Peck, Stow & W. Co....dis 33 1/3&10 %

Chain.

Trace, 6 1/2-10-2....₩ pair 79c
Trace, 6 1/2-10-3....₩ pair 70c } dis 35 %
Trace, 7-10-2....₩ pair 86c
German Halter Chain, list of Dec. 31, 1881....dis 55 %
German Coil, list of Dec. 31, 1881....dis 55 %
Covert Halter, Hitching and Breast....dis 35&5 %
Oneida Halter Chain (old list)....dis 45 %
Galvanized Pump Chain....₩ lb 9 1/2c net
Jack Chain, Iron....dis 60&10 %
Jack Chain, Brass....dis 50&10 %

Chalk.

White....₩ gross 60c net
Red....₩ gross 80c net
Blue....₩ gross $1.00 net
White Crayons....₩ gross 10c net

Chalk Lines.—See Lines

Chisels.

Socket Framing, Crossman....dis 65&5 %
Socket Framing, Arlington Edge Tool Co....dis 65&10 %
Socket Framing, Buck Bros....1876 list, dis 22 1/2 %
Socket Framing, Merrill....dis 65&10 %
Socket Framing, Witherby Tool Co....dis 65&10 %
Socket Framing, Douglass'....dis 65&10 %
Socket Firmers, Crossman....dis 65&5 %
Socket Firmers, Arlington Edge Tool Co....dis 65&10 %
Socket Firmers, Buck Bros....dis 30 %
Socket Firmers, Merrill....dis 65&10 %
Socket Firmers, Witherby Tool Co....dis 65&10 %
Socket Firmers, Douglass'....dis 65&10 %
Socket Corner....dis 65&10 %
Tanged Firmers....dis 40@45 %
Tanged Firmers, Butcher's....$5.00@$5.25 to £
Tanged Firmers, Spear & Jackson's....5.00 to £
Tanged Firmers, Buck Bros (Shank)....5.25 to £
Globe Mfg. Co....dis 65&10 %

Clamps.

Iron, Providence Tool Co.'s Wrt. Iron....dis 25 %
Iron, Adjustable, Gray's....dis 20 %
Iron, Adjustable, Lambert's....dis 20 %
Iron, Adjustable, Snow's....dis 40&5 %
Iron, Adjustable, Hammer's....dis 15 %
Iron, Adjustable, Stearns'....dis 20&10 %
Iron, Cabinet, Sargent's....dis 70&10 %
Iron, Carriage Makers', Sargent's....dis 65&10 %
Saw Clamps....See Vises

Clips, Axle.

Norway or Best....dis 60&5 %
Superior....dis 60&5 %

Cockeyes.....dis 55 %

Cocks, Brass.

Racking
Globe
Plain Bibbs
Ale and Beer } dis....55 %

Coffee Mills.

Board and Box....dis 50 %
Wilson's....dis 50 %
Selsor's Flat....$9.50, $10.50, dis 25 %
American (Enterprise Mfg. Co.)....dis 20&10 %
The "Swift" (Lane Bros.)....dis 20&10 %
Webb's Patent....dis 45@50 %

Compasses, Dividers, &c.

Compasses....dis 55 %
Calipers....dis 55 %
Dividers....dis 55 %
Bemis & Call Co.'s Dividers....dis 60&5 %
Bemis & Call Co.'s Compasses and Callipers....dis 50&5 %
Bemis & Call Co.'s Wing & inside or outside....dis 50&5 %
Bemis & Call Co.'s Double....dis 60 %
Bemis & Call Co.'s (Call's Patent Inside)....dis 30 %
Excelsior....dis 50 %
Cook's Extension....dis 25 %
J. Stevens & Co.'s Calipers and Dividers....dis 25&10 %

Coopers' Tools.

Bradley's....dis 10 @ 20 %
Barton's....dis 20 %

Corkscrews.—Humason & Beckly Mfg. Co. dis 33 1/3 %
Clough's Pat....dis 33 1/3 %

Corn Knives and Cutters.—Bradley's....dis 10 %
Wadsworths....dis 25 %

Crow Bars

Cast Steel....₩ lb 6 1/2c
Iron, Steel Points....₩ lb 5c

Curling Irons, &c.

1/2, 5/8, 3/4 in., $1.80, 2.00, 2.40....dis 10 %
Curling Tongs....₩ doz $3.65, dis 10 %
Pinching Irons....₩ doz $7.50, dis 20 %

Curry Combs.

Fitch's....dis 50&10 %
Hotchkiss, Novelty, new list, July 1880....dis 25 %
Hotchkiss, Excir. Supr. Champion....dis 25 %
Rubber....₩ doz $10.00, dis 25 %

Curtain Pins.

Silvered Glass....net
White Enamel....net

Cutlery.

Meriden Cutlery Co. (Table)....net
Am. Miller Bro.'s Cutlery Co....dis 25 %
Humason & Beckley, Pocket....dis 33 1/3 %
Saugatuck Cutlery Co....list net
Aaron Burkinshaw's Pocket....dis 25 %

Dividers....see Compasses

Dog Collars.—Embossed Gilt....dis 30&10 %
Leather....dis 40 %
Brass....dis 40 %

Door Springs.

Torrey's Rod, regular size, ₩ doz., $3....dis 50 %
Gray's Rod....dis 15 %
Bee Rod....dis 15 %
Warner's....dis 30 %
Gem (Coil):
No. 1, Large Japanned....₩ doz $4.00
No. 2, Medium, Japanned....₩ doz 2.75 } dis 50&10 %
No. 3, Small, Japanned....₩ doz 2.00
Star (Coil)—For Cop'd, Nickel-Plated &c., see list.
No. 4 ("Shoo Fly") Screen door size, ₩ doz $1.50
No. 5, Screen Door size....₩ doz 2.00
No. 6, Medium....₩ doz 2.75 } dis 60 %
No. 7, Large....₩ doz 4.00
Sabin's Lever....No. 1, $1; 2, $1.50; 3, $2; 4, $2.50, dis 35 %
Sabin's Boss, No. 1, ₩ doz. $4.00; 2, $2.75; 3, $2, dis 33 1/3 %
Sabin's Crown....₩ doz $1.50, dis 33 1/3 %
Philadelphia....5 in., $5.00; 8 in., $7.75, dis 35 %
Cowell's....No. 1, ₩ doz. $18.00; No. 2, $15.00, dis 50 %
Rubber, complete....₩ doz. $1.80, dis 10 %
Hercules....dis 50 %

Drawing Knives.

Arlington Edge Tool Co....dis 65&10 %
Crossman's No. 1....dis 65&5 %
Morrill....dis 65&10 %
Nobles Mfg. Co....dis 15 %
Bradley's....dis 35 %
Adjustable Handle....dis 20 %
Witherby Tool Co....dis 65&10 %
Douglass....dis 65&10 %
Globe Mfg. Co....dis 65&10 %

Drills and Drill Stocks.

Blacksmiths'....each, $2.50, dis 10 %
Blacksmiths' Self-Feeding....each, $7.50, dis 20 %
Breast, P. S. & W....dis 20&10 %
Breast, Hotchkiss'....dis 20 %
Breast, Wilson's....dis 20 %
Breast, Millers Falls....each, $3.00, dis 25 %
Breast, Bartholomew's....each, $2.50, dis 25&10 %
Ratchet, Merrill's....dis 10 %
Ratchet, Ingersoll's....dis 25 %
Ratchet, Whitney's....dis 20 %
Ratchet, Weston's....dis 20 %
Ratchet, Moore's Triple Action....dis 20&25 %
Whitney's Hand Drill, Plain, $11.00 Adjustable, $12.00....dis %
Wilson's Drill Stocks....dis 10 %
Automatic Boring Tools....each, $2.25, dis 20 %

Drill Chucks.

Morse's Beach Patent....dis 30 %
Morse's Adjustable....each, $10.00, dis 30 %
Danbury....each, $8.00, dis 30 %

Egg Beaters.

Dover....₩ doz. $2.50, dis 2 %
Monroe's....dis 50 %
National....₩ doz. $4.50, dis 33 1/3 %
Standard....₩ gross, $18.00, dis 25 %
Family (T. & S. Mfg. Co.)....₩ gross, $18.00, net
Acme....₩ gross, $12.00, dis 25 %
Triumph (T. & S. Mfg. Co.)....₩ gross, $11.50, net

Elevator Buckets.

Mill E. Buckets, light, 3 1/2 to 10 in. (Duc's Improved), ₩ 100, $15.00 @ $54.00....dis 10 %
Mill E. Buckets, heavy 5 to 10 in. (Duc's Improved), ₩ doz. $5.60 @ $10.20....dis 10 %
Storehouse (Duc's Patent), 12 to 17, $12 @ $20....dis 10 %

Emery and Emery Paper.

Regular numbers....₩ lb 6c
Flour and F. F....₩ lb 4c
B. & A. Emery Paper....dis 30&5 %
Sibley's Emery and Crocus Cloth, large size, $16; medium, $10.50 ₩ ream....dis 15 %

Enameled and Tinned Ware.

Kettles....dis 50 %
Sauce Pans....dis 25 %
Tinned Sauce Pans....dis 25 %

Escutcheon Pins.

Brass....dis 50 %

Escutcheons.

Door Lock....Same discounts as Door Locks
Brass Thread....dis 55 %
Wood....dis 25 %

Faucets.

Fenn's....dis 40 %
Bohren's Patent Rubber Ball....dis 25 %
Fenn's Cork Stops....dis 33 1/3 %
Star....dis 55&10 %
Frary's Patent Petroleum....dis 20&10 %
West's Patent Key....dis 45 %
Anchor Lock....dis 45 %
Metallic Key, Leather Lined....dis 60 %
Cork Lined....dis 70 %
J. Sommer's Best Metallic Key....dis 40&10 %
J. Sommer's Cork Lined, 1st quality....dis 50 %
Self-Measuring, Enterprise....₩ doz. $36.00, dis 20&10 %
Self-Measuring, Lane's....₩ doz. 36.00, dis 20&10 %
Self-Measuring, Victor....₩ doz. $36.00, dis 25&10 %

Felloe Plates.....₩ lb, 10c, dis 25 %

Files.

J. & Riley Carr....new list April 1, '83, dis 15 %
J. & Riley Carr Horse Rasps....dis 10 %
Butcher's....
Moss & Gamble....new list, dis 15 %
H. Disston & Sons....dis 45 %
Nicholson....dis 45 %
New American....dis 45 %
Union File Co....dis 45 %
Heller Bros.' Files....dis 45 %
Heller Bros.' Horse Rasps....dis 35 %
Western....dis 45 %
Stubs....new list, dis 25@30 %

Fluting Machines.

Knox, 4 1/2-inch Rolls....$3.50 each
Knox, 6-inch Rolls....$4.00 each } dis 35 %
Eagle, 3 1/2-inch Roll....$2.15, dis 35 %
Eagle, 5 1/2-inch Roll....2.85, dis 35 %
Crown, 4 1/2-in., $3.50; 6-in., $4.00; 8-in., $6.50 each, dis 35 %
Crown Jewel....6-in., $3.50 each, dis 35 %
American, 5-in., $3; 6-in., $3.40; 7-in., $4.50 each, dis 35 %
Domestic Fluter....$1.50 each, net
Geneva Hand Fluter, White Metal....₩ doz $12, dis 25 %
Crown Hand Fluter, Nos. 1, $15; 2, $12.50; 3, $10.00 ₩ doz....dis 30 %
Shepard Hand Fluter, No. 85....per doz $15, dis 40 %
Shepard Hand Fluter, No. 110....per doz $8.75, dis 30 %
Shepard Hand Fluter, No. 95....per doz $6.50, dis 20 %
Clark's Hand Fluter....₩ doz $15.00, dis 33 1/3 %
Combined Fluter and Sad Iron....₩ doz $15.00, dis 30 %
Buffalo....₩ doz $10.00, dis 10 %

Fluting Scissors....dis 45 %

Fly Traps.

Paragon....₩ doz, $3, net

Forks.

Hay, Manure and Spading....dis 50 %
Plated, A 1, Rogers & Bro....dis 40&10&5 %
Plated, Reed & Barton....dis 40&10&5 %

Fruit and Jelly Presses.

Enterprise Mfg. Co....dis 20&10 %

Fry Pans.

Burnished list as follows....dis 60&10&5 %

No.	0	1	2	3	4	5	6	7	8
₩ doz.	$3.00	3.75	4.25	4.75	5.25	6.00	7.00	8.00	9.00

"Acme"....dis 40&10 %

Gauges.

Marking Stanley's....dis 50&10 %
Marking, Chapin's....dis 55&10 %
Wire....dis 10&10 %
Wire, Disston's....dis 20 %
Wire, Wheeler, Madden & Co....dis 10 %

Gimlets.

Nail and Spike....dis 40&10 %
"Eureka" Gimlets....dis 40&10 %
"Diamond" Gimlets....dis 40&10 %
Double Cut, Shepardson's....dis 40&10 %
Double Cut, Hartwell's....dis 40&10 %
Double Cut, Ives'....dis 40&10 %
Double Cut, Douglass'....dis 40 %
"Bee"....₩ gro. $12.00, dis 25 %

Glue Pots.

Tinned and Enameled....dis 25&5 %
Family, Howe's "Eureka"....dis 25 %
Family, L. F. & C.'s "Handy"....dis 30 %

Grindstone Fixtures.

Sargents Patent....dis 70&10 %
Reading Hardware Co....dis 30&10 %

Gun Wads.

U. M. C. B. E., 11 up....$2.00
U. M. C. B. E., 9&10....2.30
U. M. C. B. E., 7&8....2.60
U. M. C. P. E., 11 up....3.10
U. M. C. P. E., 9&10....4.00
U. M. C. P. E., 7&8....4.90 } dis 5&5 %

Halters.

Covert's Pat. Rope....dis 50 %
Covert's Horse and Cattle Ties....dis 50 %
Union Pat. Rope and Web....dis 40&10 %
Union Horse and Cattle Ties....dis 40&10 %

Hammers.

Maydole's....dis 15 %
Cheney's, new list, March, 1883....dis 20&5 %
Hartford Hammer Co. (new list July 1, '81)....dis 20 %
Humason & Beckley....dis 15 %
Verree....dis 5 %
Magnetic Tack, Nos. 1, 2, 3, $1.26, 1.50 and 1.74, dis 25&10 %
Nelson Tool Works....dis 40&10 %
Warner & Noble's....dis 5 %
Yerkes & Plumb....dis 30 %
Wilkinson's Smiths'....11 1/2c ₩ lb net

Hand Cuffs and Leg Irons.

Providence Tool Co., Hand Cuffs, $15.00 ₩ doz, dis 10 %
Providence Tool Co., Leg Irons, $25.00 ₩ doz....dis 10 %
Tower's....dis 25 %

Handles.—Door or Thumb Latches.

Nos.	0	1	2	3	4	
Per doz.	$0.80	1.00	1.18	1.35	1.50	dis 60&10 %

Roggin's Latches....₩ doz 35c. @ 40c. net
Bronze Iron Drop Latches....₩ doz $0.90 @ 1.10
Jap'd Store Door Handles—Nuts, $1.62; Plate, $1.10; no Plate, $0.88....dis 10 %
Barn Door....₩ doz $1.60, dis 10&10 %
Wrought Chest....dis 70 %
Surface Chest....dis 60&10 %
Flush Chest....dis 70 %
Lifting....dis 60&10 %
Saw and Plane....dis 40&10 %
Boynton's Loop Saw Handles....50c, dis 50 %
Boynton's Centennial Saw Handles....30c, dis 35 %
Hammer and Hatchet....dis 20 %
Brad Awl....₩ gross, $1.00 dis 10 & 20 %
Hickory Firmer Chisel, assorted, ₩ gross....$4.50
Hickory Firmer Chisel, large, ₩ gross....5.00
Apple Firmer Chisel, assorted, ₩ gross....5.00
Apple Firmer Chisel, large, ₩ gross....6.00
Socket Firmer Chisel, assorted, ₩ gross....3.00
Socket Framing Chisel, assorted, ₩ gross....5.00
File assorted, ₩ gross....2.75
Auger, assorted, ₩ gross....5.00
Auger, large, ₩ gross....7.00 } dis 20&10 @ 25&10
Patent Auger, Ives'....dis 25 %
Patent Auger, Douglass'....₩ set $1.25 net
Patent Auger, Swan's....₩ set $1.00 net

Hangers.

Barn Door, old patterns....dis 60&10 %
Barn Door, New England....dis 65&10 %
Climax (Anti-Friction)....dis 50 %
Challenge....dis 50 %
"Champion" Medina Mfg. Co....$15; dis 50&10 %
Sterling Improved (Anti Friction)....dis 65&10 %
Cheritree....dis 50 %
Kidder's....dis 50&5 %
U. S....4 in., $12; 5 in., $15; dis 60 %
The "Boss"....dis 50&10 %
Terry's Patent....5 in., $12; 3 1/2 in., $10; dis 40 %
Cronk....No. 4, $12; No. 5, $14.40; No. 6, $21; dis 50

Harness Snaps.

Anchor (T. & S. Mfg. Co.)....dis 60 %
Henshaw's, list of 1 1/2 changed to $14.00....dis 60 %
Judd's, list of 1 1/2 changed to $14.00....dis 60 @ 65 %
Fitch's (Bristol), list of 1 1/2 change to $14.00. dis 60 @ 65 %
Hotchkiss'....dis 10 %
Andrews'....dis 50 %
Sargent's....dis 70&10 %
German, low list, Sep., 1882....dis 33 1/3 %
German, Sargent's new list....dis 60&10 %
Covert....dis 50 %
Covered Spring, new list, Oct., 1882....dis 60&10 %
Union....dis 50&10 %
Union Improved German....dis 60&10 %

Hatchets.

Isaiah Blood....dis 30 @ 35
Shingling, Nos. 1 2 3....₩ doz $7.25 $8.00 $8.75
Claw, Nos. 1 2 3....₩ doz 7.75 8.50 9.25
Lathing, Nos. 1 2 3....₩ doz 7.50 8.00 8.50
Hunt's....dis 25 %
Shingling, Nos. 1 2 3....₩ doz $7.25 $8.00 $8.75
Claw, Nos. 1 2 3....₩ doz 7.75 8.50 9.25
Lathing, Nos. 1 2 3....₩ doz 7.30 8.25 9.00
Hurd's....dis 30 @ 35 %
Shingling, Nos. 1 2 3....₩ doz $8.00 $8.50 $9.00
Claw, Nos. 1 2 3....₩ doz 9.00 9.50 10.00
Lathing, Nos. 1 2 3....₩ doz 8.00 8.50 9.00
Yerkes & Plumb....dis 30 @ 35 %
Shingling, Nos. 1 2 3....₩ doz $7.50 $8.00 $8.50
Claw, Nos. 1 2 3....₩ doz 8.25 8.75 9.25
Lathing, Nos. 1 2 3....₩ doz 7.50 8.00 8.50
Simmons'....dis 30 @ 35
Shingling, Nos. 0 1 2 3....₩ doz $7.50 $8.00 $8.50 $9.00
Claw, Nos. 0 1 2 3....₩ doz 8.50 9.00 9.50
Lathing, Nos. 0 1 2 3....₩ doz 8.00 8.50 9.00
Broad, Nos. 1 2 3 4....₩ doz 9.00 10.00 12.00 14.00
Broad, Nos. 5 6 7 8....₩ doz 16.00 18.00 20.00 22.00
Collins....dis 10
Shingling, Nos. 1 2 3....₩ doz $5.50 $6.00 $6.50
Claw, Nos. 1 2 3....₩ doz 6.00 6.50 7.00
Lathing, Nos. 1 2 3....₩ doz 5.50 6.00 6.50
Peck's Champion Blade....dis 30 @ 35 %
Shingling, Nos. 1 2 3....₩ doz $8.00 $8.50 $9.00
Lath, Nos. 1 2 3....₩ doz 8.00 8.50 9.00
Claw, Nos. 1 2 3....₩ doz 9.00 9.50 10.00
Half, Nos. 1 2 3....₩ doz 8.00 8.50 9.00
Ax Pattern, Nos. 1 2 3....₩ doz 10.00 11.00 12.00

Hay Knives.

"Lightning"....₩ doz $20.00 dis 10 %
Wadsworth's....dis 33 1/3 %

Hinges.

Gate, Western....₩ doz $4.90 dis 55 %
Gate, N. E....₩ doz $7.70, dis 55 %
Gate, N. E. Reversible....₩ doz $5.75, dis 55 %
Gate, Clark's, Nos. 1 2 3....dis 50 %
Gate, N. Y. State....₩ doz $5.05, dis 55 %
Gate, Automatic....₩ doz $12.50, dis 50 %
Gate, Common Sense....₩ doz pair $4.50, dis 10 %
Gate, Seymour's....dis 45&10 %
Gate, Shepard's....Nos. 1, 2, 3, 10, 20 & 25, dis 50&10 %
Rolled Blind Hinges....dis 60&10 %
Rolled Plate....dis 60&10 %
Rolled Raised....dis 60&10 %
Plate Hinges "Providence" { 8, 10 & 12 in., $5.55 ₩ 100 lb; over 12 in., $4.50 ₩ 100 lb } dis 10 %
Screw Hook and Strap { 8, 10, 12 in., $7.00 ₩ 100 lb; 14 to 36 in. $5.75 ₩ 100 lb } dis 10 %
Heavy Welded Hook { 8 to 12 in., $7.00 ₩ 100 lb; 14 in & up, $5.50 ₩ 100 lb } dis 10 %
Screw Hook and Eye { 3/4 & 1 in. 9c; 5/8 in. 9c; 1/2 in. 10c; 3/8 in. 12c } dis 20 %
Wrought Strap and T....dis 60&10&2 %

Hoes.

Riveted Shank....₩ doz $5.00, dis 5 %
Socket....₩ doz $5.25, dis 50 %
Planters'....dis 50 %
Scovill Pattern....dis 50 %
Handled Planters'....dis 50 %
Magic....₩ doz $5 net
Grub....₩ doz $11, dis 50 %

Hooks.

Bird Cage, Sargent's list....dis 60&10 %
Bird Cage, Reading....dis 40&10 %
Cotton....₩ doz $4.00, dis 50 %
Cotton Patented (N. Y. Mallet & Handle W'ks), dis 30 %
Cotton (Humason & Beckley Mfg. Co)....dis 40 %
Belt....dis 60&10
Bench—Hotchkiss' $5.00 ₩ doz....dis 10 %
Weston's, No. 1, $10.00; No. 2, $9.00 ₩ doz....dis 25 %
McGill's, $3.00 ₩ doz....dis 10 %
Clothes Line, Sargent's list....dis 65&10 %
Clothes line, Reading list....dis 45&5&10 %
Ceiling, Sargent's list....dis 60&10&10 %
Harness, Reading list....dis 40&10&10 %
Coat and Hat, Sargent's list....dis 60&10&10 %
Coat and Hat, Reading....dis 40&10&10 %
Wire Coat and Hat, Gem....dis 4 &10 %
Wire Coat and Hat, Miles'....dis 70 %
Picture Hooks, Brown's Pat. Solid Brass, $4.00 ₩ gross....dis 25 %
Tassel and Picture (T. & S. Mfg. Co.)....dis 50 %
Wrought Staples and Hooks & Staples....dis 70&7 1/2&10 %
Wrought Staples, Stanley's list....dis 70&7 1/2&10 %
Wire Screw Hooks and Eyes....new list, dis 70&10 %
Grass and Bush....dis 45@50 %
Whiffletree—Patent....dis 40 %
Hooks and Eyes—Malleable Iron....dis 60&10 %
Hooks and Eyes—Brass....dis 60&10 %

Horse Nails.

	Nos. 5	6	7	8	9	10	
Ausable, ₩ lb	31c	28c	26c	25c	24c	23c	dis 30&10 %
Clinton, Plain, ₩ lb		23c	21c	20c	19c	18c	dis 30&10 %
Clinton, Fin., ₩ lb		24c	22c	21c	20c	19c	dis 30&10 %
Essex, ₩ lb	31c	28c	26c	25c	24c	23c	dis 30&10 %
Putnam "	27c	24c	22c	21c	20c	19c	dis 5&7 %
Vulcan "	26c	23c	21c	20c	19c	18c	dis 12 1/2 %
Globe "	24c	21c	19c	18c	17c	16c	dis 12 1/2 %
A. C. "	26c	23c	21c	20c	19c	18c	dis 10&10 %
Ch'mpl'in Forged "	31c	28c	26c	25c	24c	23c	dis 30 %
New Haven "	31c	28c	26c	25c	24c	23c	dis 30&10 %
Bridgewater "	24c	21c	19c	18c	17c	16c	dis
Saranac "	26c	23c	21c	20c	19c	18c	dis 30 %

Horse Shoes.—Burden....₩ keg $4.37 1/2
R. I. Horse Shoe Co., Perkins' Improved Light, Medium and Heavy....₩ keg $4.37 1/2
Walker's Forged, Light, Med. or Heavy....₩ keg $4.37 1/2
Mule Shoes....₩ keg $5.37 1/2
Dunning's Steel....₩ keg $9.25

Ice Awls, Chisels, &c.

American Ice Chisel....₩ doz $3.00 net
National Ice Chisel....₩ doz $6.25 dis 20 %
Novelty Ice Breakers....₩ doz. $6.25 dis 20 %
White's Sliding Head Picks....₩ doz $2.50 dis 40 %
Dunlap's Ring Picks....₩ doz $2.00 dis 20 %
Wood Head Picks, Sargent's....₩ doz $1.60 dis 50&10 %
Iron Head Picks, Sargent's....₩ doz $1.25 dis 50&10 %
Ice Mallets, Pick in head....₩ doz $1.75 dis 15 %
Ice Mallets, Pick in Handle....₩ doz $2.00 dis 15 %
Ice Axes, Small Cast or Malleable....₩ doz $1.20 dis 10 %
Combination Ice Tools....₩ doz $2.00 net

Ice Cream Freezers.

Amn. Mch. Co....dis 40 %
Torrey's....dis 40 %
Packer's....dis 40 %

Ice Creepers.

Safety Reversible....₩ gross $25
Arctic Solid....₩ gross $30 } dis 10 %

Ice Tongs.

Champion....₩ doz $6.00 dis 25&10 %
Family....₩ doz $2.75 dis 15 %

Kettles.

Brass, 7 to 13 inches inclusive....₩ lb 28c net
Brass larger than 13 inches....₩ lb 32c net

Knives.—Ames' Butcher Knives....dis 20 %
Ames' Shoe Knives....dis 15 %
Ames' Bread Knives....₩ doz $1.50 dis 15 %
Moran's Shoe and Bread Knives....dis 20 %
Hay and Straw, Wadsworth's....dis 33 1/3
Table and Pocket....See Cutlery

Knobs.

Carriage (Jap'd 80c ₩ gross)....dis 60&10 %
Base—Common....dis 30&10 %
Hemacite Door Knobs....new list, dis 35&5 %
Door Mineral
Door Por. Jap'd
Door Por. Plated
Door Por. } Same discounts as Door Locks.
Furniture Plain....75c gross inch, dis 10 %
Furniture, Wood Screws....dis 20 %
Picture, Judd's....dis 60&10&10 %
Picture, Sargent's....dis 60&10 %
Hemacite, Picture....dis 35 %
Shutter, Porcelain....dis 60&10 %

Ladles.

Melting, Sargent's....dis 50&10 %
Melting, Reading....dis 30&10 %
Melting, Monroe's Patent....₩ doz $4.00 dis 40 %
Melting, P. S. & W....dis 30&10 %

Lanterns.

Tubular....No. 0, $7.50; No. 1, $9.00 With Guards, 40c extra } net
Nail City....No. 1 ₩ doz $10; No. 2, $9, net
Meteor....No. 1, ₩ doz, $9.50; No. 2 $8.50, net
Hurricane, No. 2....₩ doz $5.75, net
Peerless, No. 5....₩ doz $11.75, dis 10&10 %
Brady's Patent....dis 10&10 %
Ætna....dis 10&20 %
Yankee....dis 10&10 %
De Beque....dis 10&10 %
Police Small, $6.25; Med., $7.50; Large, $10.00, net
Convex Reflector....$2.75 ₩ doz, dis 15 %

Lawn Mowers.

Excelsior and Clipper....dis 33 1/3
Pennsylvania....dis 30 %
Philadelphia....dis 30 %

Lemon Squeezers.

Porcelain Lined....₩ doz $6.00, dis 30 %
Wood....₩ doz 3.00, dis 30 %
Eureka, Tinned....₩ doz 8.00, dis 10 %
Dunlap's Improved....₩ doz 4.50, dis 25 %
Sammis', No. 1, $2.20; 2, $8.40; 12, $14 ₩ doz; dis 20 %
Townsend's Patent....$6.00 ₩ doz; dis 20 %
Jennings "Star"....$4.00 ₩ doz net
The "Boss"....₩ doz $4.00, dis 20&10 %
Dean's Nos. 1, ₩ doz, $15.00; 2, $9.00; 3, $6.00, dis 20&10 %

Lines.—Linen Fish....dis 25&10 %
Cotton Chalk....dis 25 %
Silver Lake, Braided, Nos. 0, $6.00; No. 1, $6.70; No. 2, $7.00; No. 4, $7.50 ₩ gross....dis 25 %
Masons' Linen, No. 3 1/2, $1.50; No. 4, $2; No. 1 1/2, $2.50....net
Masons' Colored Cotton....dis 25 %
Wire Clothes, Galvanized....each 25c@40c net

Locks and Latches.

Cabinet, Eagle
Cabinet, Gaylord
Cabinet, Bridgeport } Changes made in list price of some numbers Jan. 1, 1881. dis 40 %
Cabinet, P. & F. Corbin....dis
Cabinet, A. E. Deitz....dis 30 40 %
Cabinet, Stoddard Lock Co....dis 50&10 %
Trunk, new list, Jan. 1, 1881....dis 15&2 %
Langstroth & Crane's List, Jan. 1, '77.
Round Key, Nos. 1 to 5....dis 40&10 %
Round Key, Nos. 5 1/2 to 12....dis 40&10 %
Flat Key....dis 40 %
A. E. Deitz, Flat Key....dis 30@40 %
Yale Lock Co., Flat Key....dis 35 %
"Shepardson" or "U. S."....dis 35 %
"Felter" or "American"....dis 33 1/3 %
Plate....dis 33 1/3&2 %
F. Many's "Extension Cylinder"....$10.50 ₩ doz net

DOOR LOCKS, ETC.

Branford
Norwalk
Norwich
P. & F. Corbin
Russell & Erwin
Mallory, Wheeler & Co.
Whipple Mfg. Co. } Circular Prices Revised list of June 11, 1883, dis 50 % and 2 % for cash.
Reading Hardware Co. (low list)....dis 40&2 %
Padlocks—Russell & Erwin
Mallory, Wheeler & Co.
Norwich Lock Mfg. Co.
Wm. Wilcox & Co. } dis 30&10 % and 2 % for cash
Yale Lock Mfg. Co.'s "Standard"....dis 40 %
Romer's....dis 25@40 %
Conestoga....dis 60 %
Scandinavian (Moore Bros.)....dis 50 %
J. H. McWilliams....dis 50 %
A. E. Dietz....dis 35 %
"Star"....dis 25 %
Fraim & Bro. (new list)....dis 40&10 %

Lustro.—Oz. bottles, ₩ doz $1.75 ₩ gross $17.00 net

Mallets.—Hickory....dis 10&10 %
Lignumvitæ....dis 10&10 %
Penfield Block Co., Lignumvitæ & Hickory....dis 30 %

Meat Cutters.

Dixon's (P. S. & W.) Nos. 1 2 3 4 ₩ doz. $14.00 17.00 19.00 30.00—dis 25&5 %
Miles' Challenge....Nos. 1 2 3 ₩ doz. $22.00 30.00 40.00—dis 40 %
Perry's, Nos. 1 2 3 4 4 g'rd 5 g'rd Each $2.00 4.00 5.00 11.00 13.00 36.00—dis 25&5 %
Woodruffs (P. S. & W.)....Nos. 100 110 ₩ doz. $15.00 18.00—dis 25&5 %
Hales'....Nos. 11 12 13 ₩ doz. $27.00 33.00 45.00—dis 50&10&10 %
Draw Cut....Nos. 5 2 6 8 10 Each $10.00 75.00 80.00 225.00 100.00—dis 20 %
American....dis 20&10 %
Nos. 1 2 3 4 5 Each $5.00 7.00 10.00 25.00 50.00 60.00
Enterprise....dis 25 %
Nos. 10 12 22 32 42 Each $3.00 2.60 4.00 6.00 10.00
Kieser's No. 55....$40 ₩ doz dis 40 %
Kieser's Gem....$25 ₩ doz, dis 40 %
Kieser's Monarch....$45 ₩ doz, dis 40 %
Kieser's Butcher....$40 each, dis 25 %
Silver & Deming....dis 45 %
Pennsylvania....dis 40&10 %
Nos 1 2 3 00 ₩ doz $24.00 28.00 36.00 28.00
Beef Shaver (Enterprise Mfg Co.)....dis 20&10 %

Mincing Knives.

Am. (2d quality), ₩ gross, 1 blade, $7 2 blades, $12 3 blades, $18....net
Lothrop's....dis 20&10 %
Smith's, ₩ doz, Single, $2.25; Double, $3....dis 33 1/3&10 %
Cowles Hdw. Co....dis 55 %

Molasses Gates.

Stebbins Patterns....dis 70&10 %
Stebbins Genuine....dis 67 1/2&10 %
Stebbins Tinned Ends....dis 65&10 %
Chase's Hard Metal....dis 50&10 %
Bush's....dis 20 %
Lincoln's Pattern....dis 20&10 %
Weed's....dis 15 %
Boss Nos. 1 2 3 4 $7.00 8.00 9.00 10.00 ₩ doz. dis 60&10&10 %

Nails....See Trade Report

Nuts and Washers.—(In lots less than 100 lb add 1/2c to list; 1 lb. boxes, add 1c to list.)
Square Nuts....8c off list
Hexagon Nuts....8 1/2c off list
Washers....7 1/2c off list

Nut Crackers.

Table (Humason & Beckley Mfg. Co.)....dis 33 1/3 %
Blake's Pattern....₩ doz $2.00, dis 5 %
Turner & Seymour Mfg. Co....dis 50 %

Oakum.—is on 100 bales and over 1/2 % ₩ lb.
Best....₩ lb c
U. S. Navy....₩ lb c
Navy....₩ lb 6 1/2c

Oilers.—Zinc and Tin....dis 60 %
Brass and Copper....dis 50 %
Malleable (Hammer's)....₩ doz. $4.00, dis 10 %
Prior's Patent or "Paragon" Zinc....dis 50 %
Prior's Patent or "Paragon" Brass....dis 50 %
Olmstead's, Tin and Zinc....dis 50 %
Olmstead's, Brass and Copper....dis 50 %
Broughton's, Zinc....dis 60&10 %
Broughton's, Brass....dis 50&10 %

Packing, Steam.

N. Y. Belting and Packing Co....dis 20 %

Pencils.

Faber's Carpenters'....high list, dis 40 %
Faber's Round Gilt....₩ gross $6.75, net
Dixon's Lead....₩ gross $4.00, net
Dixon's Lumber....₩ gross $6.75, net
Dixon's Carpenters'....dis 20&10 %

Picks.

Railroad, 5 to 6, $11.00; 6 to 7, $12.00....dis 50 %
Adze Eye, 5 to 6, $12.00; 6 to 7, $13.00....dis 50 %

Picture Nails.

Brass Head, Sargent's list....dis 50&10 %
Brass Head, T. & S. Mfg. Co....dis 50 %
Porcelain Head, Sargent's list....dis 50&10 %
Porcelain Head, Judd's list....dis 40&40&10 %
Porcelain Head, T. & S. Mfg. Co....dis 50&10 %
Niles' Patent....₩ doz 75c, net

Pinking Irons.....₩ doz $10.00, net

Plaiting Machines.

Magic....₩ doz $10.00, net
Astor Plaiting Machine....each $15.00, dis 20 %
Crown Plaiting Machines....dis 25 %
6 in., $6.00; 10 in., $8.00 each.

Planes and Plane Irons.

Bench, First Quality....dis 20 %
Bench, Second Quality....dis 20 %
Molding....dis 20 %
Bailey's (Stanley R. & L. Co.) new list, Jan., '79, dis 25 %
The Stanley (S. R. & L. Co.) new list, Jan. '79, dis 25 %
Bailey's "Victor"....dis 20&10 %
Defiance Adjustable....dis 20&10 %
Laflin Mfg. Co....dis 20&10 %
Plane Irons, Butcher's....$5.00 @ $5.25 to £
Plane Irons, Buck Bros....dis 25 %
Plane Irons, Auburn Tool Co....dis 25&10 %
Plane Irons, The Globe Mfg. Co., "Baldwin Iron"....dis 20&10 %
Plane Iron, Ohio Tool Co....dis 2&10 %
Plane Irons, Sandusky Tool Co....dis 25 %

Pliers and Nippers.

Button's Patent....dis 33 1/3 %
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 4 in., $15.50; No. 4, 7 in., $21.00 ₩ doz....dis 20 %
Humason & Beckley Mfg. Co....dis 30 %
Gac Pliers....dis 25 %
Eureka Pliers and Nippers....dis 20 %
Russell's Parallel....dis 25 %
P. S. & W. Cast Steel....dis 33 1/3&10 %
P. S. & W. Tinners' Cutting Nippers....add 6 % dis 10 %

Plumbs and Levels.

Disston's....dis 20 %
Stanley R. & L. Co.'s Pat. Adjustable....dis 65&10 %
Stanley R. & L. Co.'s Non-Adjustable....dis 65&10 %
Chapin's Patent Adjustable....dis 65&10 %
Chapin's Non-Adjustable....dis 65&10&10 %
Standard Rule Co.'s New Adjustable....dis 65&10 %
Standard Rule Co.'s Non-Adjustable....dis 65&10 %
Johnson's Patent Adjustable....dis 65&10 %
Pocket Levels....dis 60&10 %
Davis' Inclinometers....dis 25 %

Post Hole and Tree Augers.

Samson Post Hole Digger....₩ doz $17.00, dis 20 %
Fletcher Post Hole Augers....₩ doz $13.00, dis 20 %
Vaughan's Post Hole—6 in., $13.50; 7 and 9 in., $21.00 ₩ doz....dis 25 %
Eureka Diggers ₩ doz $27.00....net
Leed's each $2.50....net

Pruning Hooks and Shears.

Disston's Combined Pruning Hook and Saw, ₩ doz $40.00, dis 20 %
Disston's Pruning Hook....₩ doz $12.60, dis 20 %
E. S. Lee & Co.'s Pruner....dis 33 1/3
Pruning Shears....dis 30 %
Wheeler, M. & Co.'s Combination....₩ doz $12, dis 20 %
Dunlap's Saw and Chisel....₩ doz $12.00, dis 20 %

Pulleys.

Hot House and Tackle....dis 65&10 %
Jap'd Screw....dis 60&10 %
Brass Screw....dis 60&10 %
Jap'd Side....dis 60&10 %
Jap'd Clothes Line....dis 60&10 %
Hay Fork, Solid Eye....$4.50; Swivel, $5.50; dis 50 %
Hay Fork, "Anti Friction"....dis 50 %
Hay Fork, "F" Common and Pat. Bushed....dis 50 %
Hay Fork, Tarbox Pat. Iron....dis 25 %
Shade Rack....dis 45 %

Punches.

Belt or Drive....₩ doz $2.00; 2.25; 2.50 dis 45 %
Bemis & Call Co.'s Cast Steel Drive....dis 45 %
Bemis & Call Co.'s Springfield Socket....dis 25 %

Spring.....⅌ doz $7.00, dis 50&7½ %
Spring, Leach's Patent.....dis 15 %
Bemis & Call Co.'s Spring and Check.....dis 40 %
Solid, Tinners'.....⅌ doz $1.44, dis 40 %

Rail.
Sliding Door, Wrought Brass. ⅌ ℔ 43c, dis 33⅓ %
Sliding Door, Bronzed Wrt. Iron....⅌ foot 13c, dis 35 %
Sliding Door Iron, Painted.....⅌ foot 4c, dis 10&10 %
Barn Door....Inch.......... ⅝ ⅞ ⅞
Per 100 feet $2.60 3.60 5.60—dis 10 %
B. D. for N. E. Hangers—
Small. Med. Large.
Per 100 feet.....$2.10 2.70 .30—net
Terry's Wrought Iron, 50c ⅌ foot. net

Razors.
J. R. Torrey Razor Co.....dis 15 %

Razor Strops.
Genuine Emerson.....dis 45 %
Badger's Emerson.....dis
Badger's (not Emerson).....dis 33⅓ %
Imitation Emerson.....⅌ doz $2.00, dis 20 %
Hunt's.....dis 40&5 %
Chapman.....dis 15 @ 2 %
Saunder's.....dis 10
Torrey's.....dis

Rivets.
Iron and Tinned, new list, Dec. 10, 1881.....dis 40 %
In bulk, new list, Dec. 10, 1881.....dis 40 %
Copper Rivets and Burrs.....dis 50 %
Nos.. 7 8 9 10 11 12 13 14 15
⅌ ℔.. 49c 50c 52c 54c 56c 58c 60c 65c 70c

Rivet Sets......dis 33⅓&10 %

Rods.
Stair, Brass.....dis 25 %
Stair, Black Walnut.....60c. ⅌ doz. dis 10 %

Rollers.
Barn Door, Sargent's list.....dis 60&10&10 %
Acme (Anti-Friction).....dis 50 %

Rope.
Mnfs' List, August 3, 1883.....dis 1c ⅌ ℔
Manila.....⅝ inch and larger ⅌ ℔ 15¼c
Manila.....⅜ inch ⅌ ℔ 16 c
Manila.....¼ and 5-16 inch ⅌ ℔ 16½c
Manila, Tar'd Rope.....⅌ ℔ 15 c
Manila, Tar'd Lath Yarn.....⅌ ℔ 15 c
Manila, Hay Rope.....⅌ ℔ 15½c
Sisal.....⅝ inch and larger ⅌ ℔ 10½c
Sisal.....⅜ inch ⅌ ℔ 11 c
Sisal.....¼ and 5-16 inch ⅌ ℔ 11½c
Sisal, Hay Rope.....⅌ ℔ 10½c

Rules. Boxwood. Ivory.
Chapin's }
Standard } dis 70&10 % } dis 45@55 %
Stanley }
Stephens.....dis 70&10 %.....dis 55 %

Sad Irons.
From 4 to 10.....⅌ ℔ 3¼c net
Self-Heating.....⅌ doz $9.00 net
Self-Heating, Tailors'.....⅌ doz $18.00 net
Gleason's Shield and Toilet.....dis 25 %
Mrs. Pott's Irons, Doubled Pointed.....dis 35 %
Mrs. Pott's Irons, Square Back.....dis 35 %
Enterprise Star Irons, new list, July 20, 1882...dis 35 %
Combined Fluter and Sad Iron....⅌ doz $15.00, dis 15 %
Chinese Laundry (N. E. Butt Co.).....8½c, dis 15 %
New England.....5c dis 15 %

Sand Paper.
Baeder & Adamson's Flint, 00 to 1½..$4.50 ⅌ ream }
Baeder & Adamson's Flint, 2, 2½ & 3. 5.00 ⅌ ream }
Baeder & Adamson's Flint, Assorted. 4.75 ⅌ ream } dis 20&5 %
Baeder & Adamson's Star..... 3.75 ⅌ ream }
Baeder & Adamson's Emery..⅌ ream $6.50 @ 11.50 }
Bartles Flint.....$4.75&$5.25 ⅌ ream dis 35 %
Bartles Harrison, $4.75 ⅌ ream.....dis 35 %
New England, same list as B. & A. Flint.....dis 35 %
Gage's.....dis 20&5 %

Sash Cord.
Common.....⅌ ℔ 13c net
Patent.....⅌ ℔ 15c net
Silver Lake, Hemp.....⅌ ℔ 50c, dis 10&5 %
Silver Lake, White Cotton.....⅌ ℔ 50c, dis 10&5 %
Silver Lake, Drab Cotton.....⅌ ℔ 55c, dis 10&5 %
Raw Hide, ⅌ foot, ¼ in., 5c.; 5-16 in., 7c.; ⅜ in., 10c.
.....dis 15 %
Steel Ribbon.....dis 10 %

Sash Locks.
Clark's, No. 1, $10.00; No. 2, $8.00 per gross.....dis 33⅓ %
Ferguson's.....dis 33⅓ %
Walker's.....net
Hammond's Window Springs.....dis 25 %
Northup Window Springs, No. 1, $10.00 ⅌ gross..dis 15 %
"Common Sense," Japanned, Coppered and Bronzed.....⅌ gross $5.00 net
"Common Sense," Nickel Plated..⅌ gross $10.00 net
"Universal".....dis 30 %

Sash Weights.
Solid Eyes, in 500 ℔ lots and over.....⅌ ℔ 1¾c net

Sausage Stuffers or Fillers.
Miles "Challenge".....⅌ doz $20, dis 40 %
Perry.....⅌ doz. No. 15; No. 0, $21, dis 25&10 %
Draw Cut No. 4.....each $30.00, dis. 20 %
Enterprise Mfg. Co.....dis 25 %
Silver's.....dis 25 %

Saws.
Disston's Circular, Mill and Cross Cut.....dis 40 %
Disston's Hand, Panel, Rip, &c.....dis 20 %
Boynton's Lightning Cross Cuts, new list.....dis 40 %
Boynton's Circular and Mill.....dis 40 %
Boynton's Ice.....dis 25 %
Boynton's Lightning Hand, Panel and Rip.....dis 25 %
Wheeler & Clemson Mfg. Co.'s Hand.....dis 30 %
W. M. & C. Mfg. Co. Cross Cuts.....dis 30 %
Livingston's Butcher and Kitchen.....dis 20 %
Livingston's Framed Wood—
Nos.......... 101 102 103 104 105
Per doz.....$10.00 8.50 10.00 7.50 6.20 net
Peace Circular and Mill.....dis 40 %
Peace Hand, Panel and Rip.....dis 25 %
Peace Cross Cuts.....dis 35 %
Peace Band Saws, all widths.....dis 10 %
Richardson's Circular.....dis 40 %
Richardson's Mill and X Cut.....dis 40 %
Richardson's Hand Panel, Butcher and Web Saws.....dis 25 %

Saw Frames.
White, Vermont.....⅌ doz $1.50. dis 25&10 %
Red, Polished and Varnished.....⅌ doz $1.50, dis 10 %
Saw Rods.....$10 list, dis 10 & 10 %

Saw Sets.
Boynton's Patent X Cut, per doz, $12.00; Hand Saw per doz, $10.00.....dis 25 %
Stillman's Genuine.....⅌ doz $3.50 and $5.50 dis 10 %
Stillman's Imitation.....⅌ doz $3.25, dis 30&10 %
Common Lever.....⅌ doz $2.00, dis 30&10 %
Leach's.....No. 0, $8.00; No. 1, $15.00, dis 15 %
Nash's.....dis 20&10 %
Hammer, Hotchkiss.....$5.50, dis 10 %
Hammer, Bemis & Call Co.'s new Patent.....dis 40&5 %
Bemis & Call Co.'s Lever & Spring Hammer..dis 30&5 %
Bemis & Call Co.'s Plate.....dis 15 %
Bemis & Call Co.'s Cross Cut.....dis 12½ %
Aiken's Genuine.....$15.00, dis 30&10 %
Aiken's Imitation.....$7.00, dis 50 %
Hart's Patent Lever.....dis 20 %
Diston's.....dis 20 %
Morrill's.....No. 1, $15 No. 4, $12, dis 40&5 %

Scales.
Hatch, Counter, No. 171.....⅌ doz $42, dis 45 %
Hatch, Tea, No. 161.....⅌ doz $15.00, dis 45 %
Union Platform.....$6.00, dis 45 %
Fairbanks'.....dis 20 %
Riehle Bros.....dis 20 & 10 %
Buffalo Scale Co.....dis 20&5 %
Forsyth Scale Co.....dis 25 %
Howe's.....dis 20&10 %
Chatillon's Grocers'.....dis 40 %
Chatillon's Eureka.....dis 25 %
Family Universal, 12 ℔, $30; 24 ℔, $6.....net
Family Favorite.....dis 30 %
Family, Turnbull's.....dis 30 %
Scale Beams, List of January 12, 1882.....dis 4&10 %

Scrapers.
Adjustable Box Scraper (S. R. & L. Co.), $6.40, dis 20&10 %
Box 1 Handle.....⅌ doz $4.00, dis 10 %
Box Handle.....⅌ doz $6.00, dis 10 %
Defiance Box and Ship.....dis 20&10 %
Foot.....dis 20&10 %
Ship, common.....⅌ doz $3.50 net
Ship, Providence Tool Co.....dis 10 %

Screen Corners.
Porter's Pat Windowand Door Frame.....dis 33⅓

Screw Drivers.
Douglas Mfg. Co.....dis 20&10&10 %
Disston's.....dis 20 %
Disston's Patent Excelsior.....dis 30 %
Buck Bros.....dis 20 %
Stanley Rule & Level Co.'s, Varnished Hdls..dis 20&10 %
Stanley Rule & Level Co.'s, Black Handles..dis 20&10 %
Sargent & Co.'s.....dis 10 %
Gay's Double Action Ratchet
⅌ doz. 4 in., $9.00; 5 in., $10.30; 6 in., $12.00—dis 35 %
Mallett & Co.'s Double Action Clutch
⅌ doz. 4 in., $7.00; 5 in., $8.00; 6 in., $9.00—dis 15 %
Champion.....dis 10 %
Clark's Patent.....dis 70 %

Screws.
Flat H'd Iron, new list, Dec. 27, 1882.....dis 55 %
Flat Head Brass, new list, Dec. 27, 1882.....dis 50 %
Round Head Iron, new list, Dec. 27, 1882.....dis 55 %
Round Head Brass, new list, Dec. 27, 1882.....dis 45 %
Brass and Silver Capped.....dis 40 %
Japanned, list of Plain Screws.....dis 20&10 %
Coach, Patent Gimlet Point.....dis 70 %
Coach, Common or Lag.....dis
Bed.....dis 10@20 %
Machine, Flat Head, Iron.....dis 55 %
Machine, Round Head, Iron.....dis 50 %
Bench, Iron.....dis 55&10 %
Bench, Wood, Beech.....dis 10 %
Bench, Wood, Hickory.....dis 20&10 %
Hand, Wood.....dis 15&10 %
Hand Rail, Sargent's.....dis 10 %
Hand Rail, Humason, Beckley & Co.'s.....dis 60&5&10 %
Hand Rail, Am. Screw Co., list of Jan. 1, '81.....dis 70 %
Jack (Wilson's).....dis 25 %

Screw Window Balances.
R. Huguenin's, No. 1, $2.10; No. 2, $1.75; No. 3 $1.00.....⅌ doz net

Scroll Saws.
Lester, $10.00.....dis 25 %
Rogers, $5.50.....dis 25 %

Shears and Scissors.
American (Cast) Iron.....dis 70&5@10 %
Pruning.....See Pruning Hooks and Shears.
Barnard's Lamp Trimmers.....⅌ doz $3.75
Tinners.....add 5 %, dis 10 %
Seymour's, List, Dec., 1881.....dis 60 %
Heinsch's, List, Dec., 1882.....dis 60 %
Heinsch's Tailor's Shears.....dis 33⅓ %
Mass. Cutlery Co. Sst. Trimmers.....dis 75 %
Cast Steel Trimmers.....dis 80 %
Wiss, J., & Sons' list Dec. 1881.....dis 60 %
Wiss, J., & Sons' Tailors' Shears.....dis 50 %

Sheaves.
Sliding Door, M. W. & Co., list.....dis 45&2 %
Sliding Door, R. & E. list.....dis 60&2 %
Sliding Door Patent Roller.....dis 50&2 %
Sliding Door, Russell's, Hatfield's.....dis 60&2 %
Sliding Door, Russell's Anti-Friction.....dis 60&2 %
Sliding Door, Moore's Anti-Friction.....dis 60 %
Sliding Shutter, R. & E. list.....dis 60&2 %
Sliding Shutter, Sargent's list.....dis 50&10 %
Sliding Shutter, Reading list.....dis 50&10 %
Moore's Anti Friction (Hanging).....dis 60 %

Shovels and Spades.
Ames, New list, July 1, 1881.....dis 15 %
Griffiths.....dis 50&5 %
Old Colony.....dis 15 %
Payne Pettebone & Son, new list.....dis 40&10 %
Payne Pettebone & Son, R. R. Shovels.....dis 15 %
Remington's (Lowman's Patent).....dis 30 %
Rowland's.....dis 50&5 %

Shovels and Tongs.
Iron and Brass Head, R. & E. list.....dis 60&10&2 %
Iron and Brass Head, P. S. & W.....dis 50&5&10 %
Polished Steel, new list.....dis 50&10&2 %

Slates.
Square Frames, by case.....dis 70 %
Less than a case.....dis 65&10 %

Spoke Shaves.
Defiance Metallic.....dis 20&10 %
Iron.....dis 45 %
Wood.....dis 30 %
Bailey's (Stanley R. & L. Co.), new list.....dis 30&10 %
Stearns'.....dis 30&10 %

Spoke Trimmers.
Bonney's.....⅌ doz $10.00, dis 40&5 %
Stearns'.....⅌ doz $9.00, dis 20&10 %
Ives'.....No. 1, $15.00; No. 2, $12.00 ⅌ doz, dis 55&10 %
Douglass'.....⅌ doz $9.00, dis 15 %

Spoons.
Basting.....dis 65&10 %
Solid Table and Tea.....dis 65 %
Britannia.....dis 60&10 %
Reed & Barton.....dis 40&10&5 %
Holmes, Booth & Haydens.....dis 40&10&5 %
German Silver.....dis 30&10&5 %
Cast Steel, Silver Plated.....dis 33⅓ %
Tin (P. S. & W.), Teas.....$1.25 ⅌ gross, net
Tin (P. S. & W.), Tables.....$2.00 ⅌ gross, net
Tin (Cowles Hdw. Co.).....dis 10 %
Tin (Cowles Hdw Co.), case lots.....dis 20 %

Stocks and Dies......dis 5&10 %
"Lightning" Screw Plate.....dis 10 %

Stone.
Hindostan No. 1, 6c; Axe, 8c.....dis 40 %
Sand Stone.....⅌ ℔ 5c, dis 33⅓&10 %
Washita Stone.....No. 1, ⅌ ℔ 18c net
Washita Stone.....No. 2, ⅌ ℔ 16c net
Washita Stone, Slips.....No. 1, ⅌ ℔ 37c net
Arkansas Stone No. 1, 4 to 6 in.....⅌ ℔ $1.35 dis 10 %
Arkansas Stone No. 1, 6 to 9 in.....⅌ ℔ $2.00 dis 10 %
Turkey Oil Stone (Chase).....4 to 8 in., ⅌ ℔, 60c, dis 10 %
Turkey Slips (Chase).....$1.75 ⅌ ℔ dis 10 %
Lake Superior (Chase).....⅌ ℔ 16c, dis 10 %
Lake Superior, Slips (Chase).....⅌ ℔ 30c, dis 10 %
Grindstones, Family, Loring's.....dis 10 %

Stove Polish.
Joseph Dixon's.....⅌ gross $6.00, dis 10 %
Gem.....⅌ gross $4.50, dis 10 %
Gold Medal.....⅌ gross $6.00, dis 25 %
"Mirror".....⅌ gross $6.00, dis 5 %
Lustro.....⅌ gross $4.75, net
Ruby.....⅌ gross $3.75, net
Rising Sun.....⅌ gross $5.75, net
Dixon's Plumbago.....⅌ ℔ 8c, net
Loynton's Noon Day ⅌ gross No. 1, large, $5.50 No 2, small, $3; No. 3, medium, $4.

Squares.
Steel and Iron.....dis 50&10&2 %
Nickel Plated.....dis 50&10&2 %
Try Square and T Bevels.....dis 50&10 %
Disston's Try Square and T Bevels.....dis 40 %
Winterbottom's Try and Mitre.....dis 20&10 %

Tacks, Brads, &c.
New List, Sept. 1, 1882.
Tinned Swedes Tacks.....dis 30 %
Tinned American Tacks.....dis 30 %
Swedes Tacks, all kinds.....dis 30 %
American Cut Tacks.....dis 30 %
Copper Tacks and Nails.....dis 30 %
Swedes Hungarian Nails.....dis 35 %
Gimp and Lace Tacks.....dis 30 %
Gimp and Lace Tacks, Tinned.....dis 30 %
Finishing Nails.....dis 25 %
Trunk and Clout Nails.....dis 25 %
Common and Patent Brads.....dis 20 %
Basket Nails.....dis 20 %
Brush Tacks.....dis 20 %
Leathered Carpet Tacks.....dis 20 %
Cigar Box Nails.....dis 20 %
Chair Nails.....dis 20 %
Extra 10 % on all.
Double-pointed Tacks.....dis 40&5 %

Tap Borers.
Common and Ring.....dis 20 %
Ives' Tap Borers.....dis 15&10 %
Enterprise Mfg. Co.....dis 20&10 %

Tapes, Measuring.
American.....dis 25 %
Spring.....dis 25&10 %
Chesterman's.....regular list dis 20@25 %

Thermometers.
Tin Case.....dis 75&10 %

Tobacco Cutters.
Enterprise Mfg. Co. (Champion).....dis 20&10 %
Wood Bottom.....⅌ doz $10.00, dis 25&10 %
All Iron.....⅌ doz $8.25, dis 35 %
Nashua Lock Co.'s.....⅌ doz $18.00 dis 50&5 %
Wilson's.....dis 35 %
Clipper (Sargent & Co.).....⅌ doz $18.00, dis 20 & 10 %

Toe Calks.
Winsted.....⅌ ℔ 9c, dis 5

Tinners' Tools and Machines.
Machines (P. S. & W.).....list add 20 % } dis 10 %
Tools (P. S. & W.).....add 6 % }

Transom Lifters.
Wollensak's Patent.....dis 35 %
Reiher's Patent, new list, Feb., 1882.....dis 20&10&10 %
Excelsior.....dis 50&10&2 %

Traps.
Game, Newhouse.....dis 35 %
Game, Oneida Pattern.....dis 60 %
Game, Blake's Patent.....dis 40&5 %
Mouse, Wood, Choker.....⅌ doz holes, 15c
Mouse, Round Wire.....⅌ doz $1.50, dis 10 %
Mouse Cage, Wire.....⅌ doz $2.50, dis 10 %
Mouse, Catch-em-alive.....⅌ doz $2.50, dis 15 %
Mouse, "Bonanza".....per gross $10.00 net
Rat, "Decoy".....⅌ doz $10.00, dis 20 %

Trowels.
Lothrops' Brick and Plastering.....dis 25 %
Reed's Brick and Plastering.....dis 15 %
Disston's Brick and Plastering.....dis 20 %
Peace's Plastering.....dis 25 %
Clement & Maynard's.....dis 20 %
Rose's Brick.....dis 15 %
Brades' Brick.....dis 25 %
Worrall's Brick and Plastering.....dis 20 %
Garden.....dis 55 %

Triers.
Butter and Cheese.....dis 25 %

Trucks (Warehouse, &c.
Penfield Block Co.'s list, 1882.....dis 40 %

Vises.
Solid Box.....dis 35 %
Solid "Crown" (A. H. Hildick).....40 to 100 ℔, 15c net
Solid, Peter Wright's.....15½c
Solid, Wilkinson's.....14@15c
Parallel, Parker's.....dis 10 %
Parallel, Wilson's.....dis 35&10 %
Parallel, Howard's.....dis 20&10 %
Parallel, Merrill's.....dis 15 %
Parallel, Sargent's.....dis 60&10 %
Parallel, Backus and Union.....dis 40 %
Parallel, Oval Slide.....dis 40 %
Parallel, Double Screw Leg.....dis 15&10 %
Parallel, Prentiss.....dis 25 %
Parallel, Simpson's Adjustable.....dis 25&5 %
"Family," List.....net
Saw Filers, Bonney's.....⅌ doz $24.00, dis 20&10 %
Saw Filers, Stearn's.....dis 20&10 %
Saw Filers, Hopkins'.....⅌ doz $17.50, dis 10 %
Saw Filers, Reading.....dis 40&10 %
Cowell Hand Vises.....dis 20 %
Richardson's Vise and Anvil.....dis 25 %

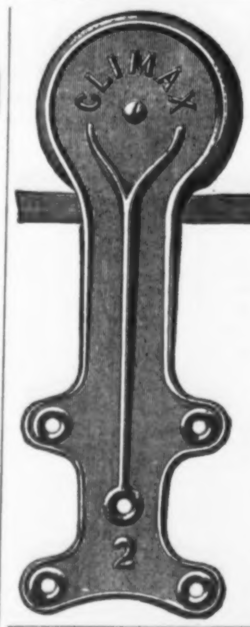
Washer Cutters.
Smith's Patent.....⅌ doz $12.00, dis 25 %
Johnson's.....⅌ doz $11.00, dis 33⅓ %
Penny's.....⅌ doz Pol. $17.50; Jap'd, $16.50, dis %
Appleton's.....⅌ doz $16.00, dis 60&10 %

Washers.—See Nuts and Washers.
Well Wheels.....dis 60&10 %

Wire.
Brass and Copper.....dis 33⅓ %
Market, Bright and Annealed.....dis 55 @ 57½ %
Market, Coppered.....dis 50 @ 52½ %
Market, Galvanized.....dis 45 @ 47½ %
Market, Tinned, Tinned list.....dis 47½ @ 50 %
Stone, Bright and Annealed Nos. 0 to 18 .dis 57½ @ 60 %
Stone, Bright and Annealed Nos. 19 to 26...dis 60 @ 65 %
Stone, Bright and Annealed Nos. 27 to 36.dis 62½ @ 70 %
Stone, Galvanized Nos. 10 to 30.....dis 45 @ 50 %
Stone, Tinned, Tinned list.....dis 45 @ 47½ %
Tinned Broom Wire.....dis 57½ @ 60 %
Cast Steel Wire.....dis 47½ @ 50 %
Annealed Fence, Nos. 8 & 9.....dis 57½ @ 60 %
Annealed Grape, Nos. 10 to 14.....dis 57½ @ 60 %
Fence Staples.....⅌ ℔ 5¼ @ 5½c
Fence Staples, Galvanized.....⅌ ℔ 6¼ @ 6½c
Stubs Steel Wire.....$0.00 to £ dis 20 %
Japanned Barb Fence.....⅌ ℔ 6¼c
Galvanized Barb Fence.....⅌ ℔ 7¼c
Steel Music Wire, Nos. 7 to 30.....$1.00 ⅌ ℔
Picture Wire, T. S. & J.....dis 40 %
Clothes Line Wire, Galvanized.....⅌ coil 25 @ 40c net
Wire Cloth, green, drab and black, ⅌ sq. ft., 2c. @ 2¼c.....net

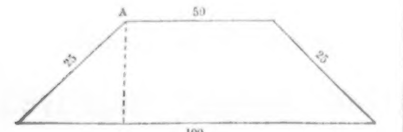
Wrenches.
American Adjustable.....dis 40 %
Baxter's Adjustable "S," list Jan., 1880.....dis 20&5 %
Baxter's Diagonal.....dis 20&5 %
Coes' Genuine.....dis 50&3 %
Coes' "Mechanics".....dis 50&10&3 %
Coes' Pattern, Malleable.....dis 75 %
Coes' Pattern Wrought.....dis 65@70 %
Girard Standard.....dis 60 %
Girard Agl.....dis 70 %
Bemis & Call's Patent Combination.....dis 20 %
Bemis & Call's Merrick's Pattern.....dis 35 %
Bemis & Call's Brigg's Pattern.....dis 25 %
Bemis & Call's Cylinder or Gas Pipe.....dis 40 %
Van Wagoner & Williams' Basin.....⅌ doz $4.50
Aiken Pocket (Bright).....$6.00, dis 50&10 %
The Favorite Pocket (Bright).....⅌ doz $4, dis 40 %
Webster's Patent Combination.....dis 25 %
Taylor's Farmers'.....dis 25 %

Wringers. Per doz.
Universal, XX, No. 2½.....42.00
Universal, XX, No. 2.....45.00
Universal, XX, No. 1½.....51.00
Universal, XX, No. 1.....56.00
Peerless, no Cogs, No. 1.....42.00
Peerless, with Cogs, No. 2½.....45.00
Peerless, with Cogs, No. 2.....48.00
Peerless, with Cogs, No. 3.....54.00
Peerless, with Cogs, No. 4.....66.00
Eureka, No. 2.....42.00
Novelty No. 2, for Common Tubs.....$42.00
Novelty No. 3, for Common Tubs.....$48.00
Excelsior No. E, for Stationary Tubs.....$51.00
Excelsior No. F, for Stationary Tubs.....$57.00
Excelsior No. A, with Folding Bench.....$60.00
Excelsior No. B with Folding Bench.....$66.00
Lots of 1 doz., dis $3 ⅌ doz.; lots of 5 doz., dis $6 ⅌ doz.



(Continued from Page 30.)

sion had been made out to some of the lakes north of Boston. Just as we reached Boston on the return trip a lady handed a card to me, which she said contained a little problem that she would like to have solved. A sketch was on the card, and thanking her and promising to look at it, I put the card in my pocket and went to the hotel, and from there went to Gilmore's grand musical festival, which took place in Boston that summer, and in the interval between two parts of the performance I thought of that card, and without taking it out of my pocket, the picture on the card came into my mind, and this is what she gave me (see Fig. 4).



Machine Construction.—Fig. 4.—A Problem to be Solved.—Required, the Area.

Now, what is the area of that figure? I have often amused myself giving this problem to people and noting their replies. I remember giving it to a surveyor in the city of Philadelphia, one of the Board of Managers of the Franklin Institute. "I will tell you how to do it," he said, "I will make a perpendicular here. Now I have the starting point of the thing. This is 25 feet long, and, let me see—you have got to get the length of this." And so he went on, little by little, more and more confused for want of figures, not thinking to add the three short sides together. They would, so added, have made only a hundred, and it would have brought the three sides down to the fourth side, and the top and bottom lines would have come together, and there would have been no area. You see this is a false drawing,

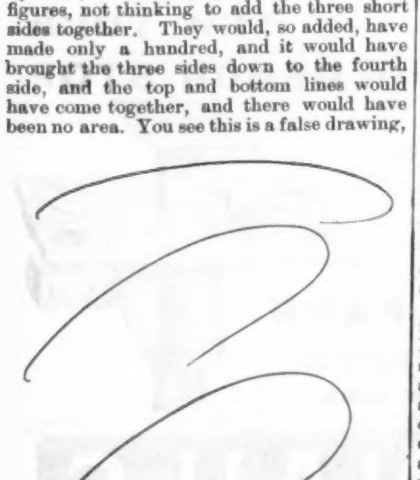


Fig. 5.—Examples of Switches.

but a great many people fail to see a catch like that, and this shows that in addition to drawing there is required a certain amount of education of the perceptive faculties.

In a drawing we look to see whether parts of machines interfere with one another. Every part of a machine must be made to do its allotted work, and do it without clashing; so that an engineer ought to be able to look at a drawing and detect the errors. He must be able to do it, not merely by looking at a thing right side up, but also by looking at it wrong side up. To him there must be neither up nor down to it. It should make no difference to him whether it is presented to him one way or another. It is not necessary for any of you, in looking at a map in the geography, to place it in any particular position to have it perfectly understood. And, what is more, an engineer must be able to make the drawing just as readily up side down as right side up. I invariably draw facing toward the person to whom I wish to explain the subject. What I mean by that is this (placing a large card before him). Suppose it is necessary to talk to some one about a machine that is to be contrived. For instance, to make it perfectly plain, some one wishes a hydrostatic press made to perform a certain amount of work. That

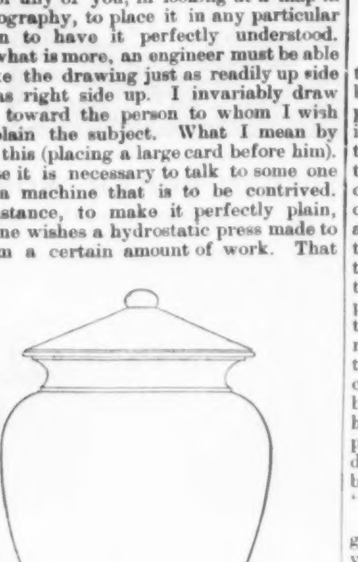


Fig. 6.—The Use of Switches in Industrial Design.

press must have a certain amount of motion, and he wishes to know how it is to be arranged. I would tell him that I think the best way would be to construct the press (drawing on the card, as he talks, and looking at it from the top, but drawing it right side up for the audience) in such a way as to make the packings accessible, and I would thus proceed with the explanation and the drawing, drawing the figure up side down to me. I give you this illustration to show you that that is the way to work. We endeavor in all cases to so comprehend the subject that there is no up nor down to it, and I advise you, every one, when learning to draw, to try to acquire that method of drawing up side down, as well as right side up, so far as constructive drawings are concerned.

In reference to the instruments which are used, you are all probably familiar with them. I have told you that drawings are made for the machine shop with instruments. These instruments are very few. They consist of a T-square and certain triangles that rest upon the T-square, and a handful of instruments such as I have in my hand here. Generally, the young draftsman comes into the drafting-room with a lot of highly-polished instruments in a wooden, velvet-lined case, but he ends with a handful that are thrown promiscuously into the drawer. In addition to these instruments, there are certain shapes that cannot be produced with the compass and square. They are represented by what are sometimes called French curves.


Fig. 7.—Further Examples of the Practical Use of Switches.

When I first commenced to work at drawing, I got hold of a wrinkle which Mr. Nasmyth claims to have invented in 1836, and which probably he did originate. It is a process of producing irregular forms such as I have described. According to this principle this little curve was made (showing an elliptical-shaped piece of wood). It has been a pet curve of mine, and it is made by the process which Mr. Nasmyth calls a "switch." If, upon a piece of cardboard, you make with a pencil a quick motion like that (illus-


Fig. 8.—The Alteneder Joint.

trating), you will produce a curve much better and more perfect than can possibly be produced by any slow motion, because the impetus given to the hand in passing across the paper produces a graceful shape. I will take this piece of cardboard and cut out the curve so made and explain to you its use. You can from this cardboard transfer the line to a piece of wood, and then, to true the edge to the curve, rub it with sandpaper. Now, in this the fingers come into play as safer guides than the eye. If you rub it on the sandpaper to produce a proper shape, you can tell better by the fingers whether you have removed the irregularities than you can by the eye (drawing a figure of an urn). You can readily see how geometrical figures can be produced by this. Mr. Nasmyth says that he has explained this principle frequently to potters, showing them how to produce new designs. He gives in his book a number of beautiful forms produced by combining these "switches."

I would like to tell you what constitute good and bad instruments. If you give a young man good tools he will do better work than with poor ones. There is nothing which has passed through such a period of nonsensical construction as the instruments called compasses and dividers used by draftsmen. Here is a compass (exhibiting) devised by one of the most celebrated English manufacturers, which I have had ever since I was a boy. The joint is made of several leaves of steel passing between leaves of brass. It is in some places very tight and in others very loose, so that there is no certainty in its action. You always feel uncertain as to how you are going to close it. It was left for a German living in Philadelphia, named Alteneder, to produce a satisfactory joint. Here is a compass constructed on that principle. If you load this leg with a certain load it will pass around through its whole arc with exactly the same resistance, and with the same velocity at all points. How does he accomplish this? The method of doing it is one of the most instructive examples of common sense applied to material. If you press one substance on another and have only the two surfaces in contact, if they are plane surfaces there will be the same friction in all the parts. So, instead of making the old form, he arranged it in this way (sketch, illustrating by drawing, Fig. 8.) He halves the two legs of the compass so that one surface of each half shall be in contact with one surface of the other half; then he holds them in contact by means of a yoke and set screws on the yoke, which press the surfaces in contact with even elastic pressure, and the two comparatively true planes work in each other with an even motion and no tight or loose places. This joint was protected by patents in America, but it is manufactured in various parts of Europe, and I suppose every draftsman who aims to get a good instrument endeavors to get one constructed on this principle.

In regard to teaching drawing—and I must reiterate that there is an absolute need of drawing in the machine shop—it must be remembered that nothing can be constructed that is not first illustrated by a drawing. I will go further, and make it show some money value. There are some machines in process of construction at the present time in which not only a single draftsman has devoted his whole time from morning till night, but one, two and three men of the best talent in the engineering department have been spending their time upon for two or three years, and still the drawings are not completed. No matter how many thousands of dollars are spent there, it is money saved if the machine is only right on paper before it goes into the shop. Mistakes on drawings cost a great deal when they have to be corrected in iron. There has been some difference of opinion between the schools and the shops in regard to the arrangement of the various views in a constructive drawing. A drawing of this kind contains a representation of the object from as many different standpoints as are necessary to show the form completely—that is, we may make a view of the top, of the bottom, of each side and each end, and perhaps a number of sectional views besides. Now, it is a matter of considerable importance that these views shall be so arranged that we can tell at a glance what relation they bear to one another. Now, it happens that the method usually used in the schools is not convenient for actual shop use, and is therefore not employed by the best draftsmen. I will illustrate the difference (making a drawing of a locomotive). This is a drawing of a locomotive such as a child would draw. This represents a side view. The school or descriptive geometry method would make the plan of the top underneath the side elevation. It would place the end view of the cow-catcher at the other end of the drawing, and would put the cab at the cow-catcher end. The common sense or shop method would place each view nearest to the part of the object which it represents. It would draw the cab at the cab end, because it is easier to do so than to transfer all the lines to the other end. We have had a hard fight in regard to this thing with the schools. Pupils coming from the schools into the workshops have to have this notion beaten out of their heads. Not all the schools teach in this way. Our own school of the Pennsylvania Museum, under Mr. Miller, and also the Franklin Institute, teach it as it should be taught; so does the Spring Garden Institute, and I believe the University of Pennsylvania teaches it properly; so does the Stevens Institute at Hoboken, and the Cornell University. It would seem to be easy enough to correct this fault. You might think that you would only have to tell a person to make the change and he would do it; but it is not so easy. It is only with difficulty that you can get out of men's minds the habits formed at school.

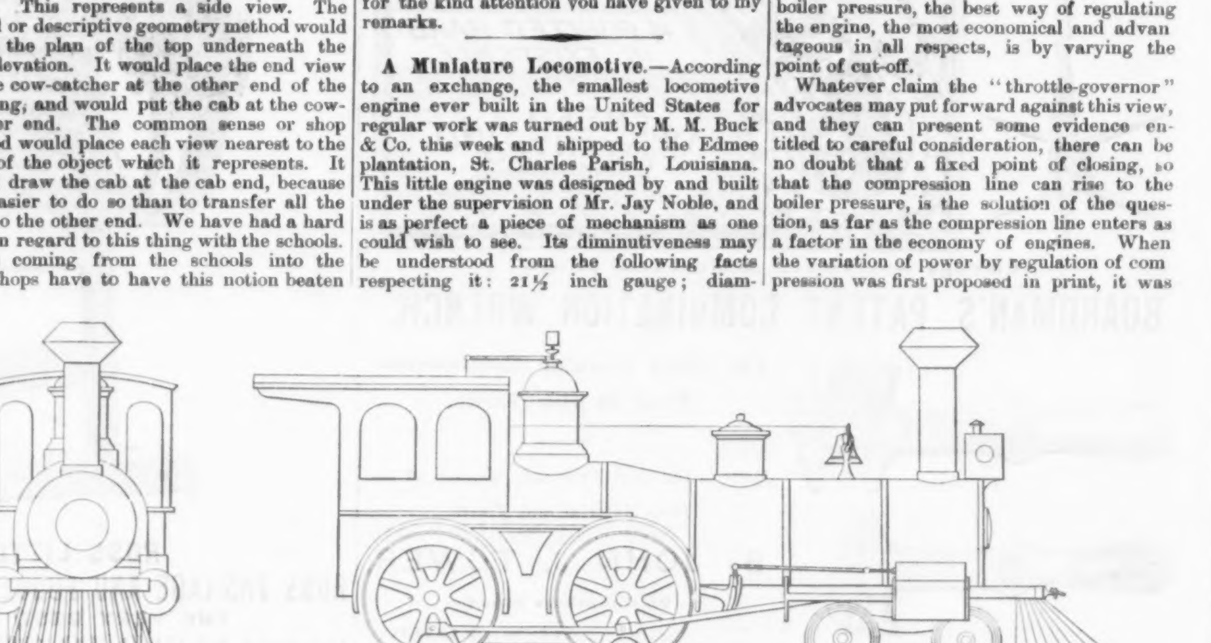


Fig. 9.—Drawing of a Locomotive.

In regard to teaching drawing itself, I wish you to bear in mind—those of you who are going to be teachers—that it is not a difficult matter to teach drawing. It is not absolutely necessary for a person who teaches drawing to draw well, although it is better that he should do so. It is possible for everybody to explain thoroughly what is required. If you tell a child to draw a line straight (by all means do not compel him to draw lines at first, but let him make some kind of pictures of objects), how are you to convince a child that a line is or is not straight. You can show it to him with a stretched string as well as with a rule or a perfect straight-edge. So, in teaching drawing in public schools, if you will only not try to cram the scholars with too many rules, and let them do the best they can, they will learn to draw. And how will they learn? Why, by drawing. The more you do, the better work you will do. If you begin with a young child, drawing will be easier than any other of its studies.

A man came to me one day, and said: "I have made a great invention; I have got a machine for clipping horses. It is a very ingenious thing indeed. I will explain it to you. Let me see. Here is where I get the power from (making a dot on the blackboard, Fig. 10), then I take it right down here (drawing a slanting line), then I go off here and I put the clipper here, and from this point I transfer the power there." I asked him, "How do you do it?" But I found he had not an idea of how the joints should be made, and that is just what he wanted me to invent for him, and a flexible joint was my part of the invention, and that was really all there was in it. He had a general idea in his head, but he had not worked out any of its details. He thought it might be done, and so concluded he had invented it. That matter of invention is a matter that cannot be too carefully guarded. I have the utmost contempt for professional inventors who invent for the sake of inventing, hoping to make a happy hit. A man should have no pride of invention. You have to bring yourself to that before you can do good work. If to-day you should invent a thing and find that it does not thoroughly accomplish the purpose for which it was intended, or that some other person had anticipated you in it, no pride in the invention should prevent you from throwing the machine into the scrap pile, and you should commence on another basis.

We were at one time building a large machine for the Russian Government, and it was necessary to cause an immense weight to be lifted by a screw; but the screw would turn backward, and something must be done to prevent this reaction. I told the draftsman to put a certain device at the bottom of

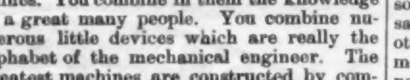


Fig. 10.—Machine for Clipping Horses.

the screw, and I sketched it for him in a free-hand sketch; but all that night I was worried about it, and I told him the next day that I thought it had already been patented by some one. But he looked at me and said: "You invented that device yourself," and he went to the patent drawer and took out a patent for that very device which I had procured some years before, and I found that I had actually invented it myself. In written language you have letters; you combine these letters into words, and these words are again combined into sentences, and these express the ideas which you wish to convey to the world. So it is with machines. You combine in them the knowledge of a great many people. You combine numerous little devices which are really the alphabet of the mechanical engineer. The greatest machines are constructed by combinations of simple mechanical devices, based upon the lever and the screw.

I find I have talked even longer than I intended, and so will not detain you any longer, but, in conclusion, desire to thank you for the kind attention you have given to my remarks.

A Miniature Locomotive.—According to an exchange, the smallest locomotive engine ever built in the United States for regular work was turned out by M. M. Buck & Co. this week and shipped to the Edmee plantation, St. Charles Parish, Louisiana. This little engine was designed by and built under the supervision of Mr. Jay Noble, and is as perfect a piece of mechanism as one could wish to see. Its diminutiveness may be understood from the following facts respecting it: 21½ inch gauge; diameter of cylinder, 6½ inches; stroke, 10 inches; four wheels; diameter of driving-wheels, 22 inches; hight of engine to top of boiler, 4 feet 7 inches; weight, without water, 5250 pounds. The engine has link-motion and is made of the best materials throughout. The boiler is made of ¼-inch iron and is 30 inches in diameter in the barrel. It is provided with an Orm patent pop-valve, has a steel fire-box, and is fed by two inspirators. The tank is made of No. 10 iron, has four wheels of a diameter of 16 inches, a capacity of 380 gallons, and weighs, without water, 1400 pounds. In experimenting with the engine before it was shipped, it was found to act very obediently under the hand of the engineer, being quick at starting and stopping. On a 90-foot track a good speed was attained and the engine stopped before leaving the end of the track. It will be used on a portable railroad, in building which T-iron weighing only 10 pounds to the yard will be used. This road, it may be added, is to be used for the transportation of sugar cane, and will therefore be extended or moved as often as is necessary to keep it connected with that part of the field where the cutting of the cane is in progress. On this kind of a road the little engine is expected to draw 40 cars measuring 8 feet in length in the bed, 5 feet wide and 15 inches high, and loaded with 80 tons of cane.

Regulation of Steam Engines by Compression.

The view seems to be gaining ground in some quarters, says the *American Engineer*, that since in every particular engine there is some point of cut-off, the adherence to which insures the greatest economy, the regulation of the engine to meet the variation of power demanded from it can be secured most advantageously by varying the compression instead of the expansion. This view, however, is an erroneous one. The best point of cut-off or the best ratio of expansion in any engine is determined and fixed by the consideration that the power developed shall be such as will make current money cost per horse-power per hour less than that of any other power which the engine could develop with the same initial pressure and rate of revolution. Now, the engine being designed and run to develop the usual or average horse-power with this ratio or expansion for greatest economy, a variation of power must be provided for, and such variation, be it an increase or decrease, involves a somewhat less economy. This is true, whether the decrease or increase of power takes place by a change of the rate of expansion or by leaving that point fixed and changing the compression. On the other hand, investigation shows that when the best point of cut-off for average conditions of running is determined and used, the point of cut-off can change during running to meet necessary fluctuations of power of 10 per cent., or even slightly more, on each side of the average or usual power required, without at all sensibly affecting the usual economy of the steam engine. This would apply with equal effect to the change of compression, and the regulation by change of compression or by change of expansion would be on a par were it not for the following fact:

The ratio of expansion which economy of current money expense dictates is in practice greater than that which would secure the best efficiency of fluid. So if less power is needed it is preferable to deviate from the most economical point of cut-off, by cutting off shorter and gaining the advantage of supurior efficiency of fluid, rather than to adhere to fixed point of cut-off and increase the compression. If greater power is needed, a change of compression will allow for such increase only to a limited degree, except the compression be very great when the engine is running under ordinary conditions, and the latter will not be an economical mode of running for reasons just stated in regard to the consideration of a development of less power than the usual amount.

As Mr. Porter says, in referring to this mode of regulation in cases of mills which run with an almost unvarying load all day, a variation of 10 or 20 per cent., possibly sometimes 5 per cent., is all that is necessary to be provided for in practice; on the other hand, when the range of variation is more extreme, the compression line would not by any means provide the requisite variation in the power exerted by the engine. He sums up the whole question tersely by upholding that with a fixed point of closing and a small percentage of waste-room, so that the compression line can rise to the boiler pressure, the best way of regulating the engine, the most economical and advantageous in all respects, is by varying the point of cut-off.

Whatever claim the "throttle-governor" advocates may put forward against this view, and they can present some evidence entitled to careful consideration, there can be no doubt that a fixed point of closing, so that the compression line can rise to the boiler pressure, is the solution of the question, as far as the compression line enters as a factor in the economy of engines. When the variation of power by regulation of compression was first proposed in print, it was evident that this proposition resulted from an erroneous impression as to why a moderate ratio of expansion secured the greatest economy in the running of the engine. It was, of course, because this ratio, determined by a method taking into consideration all the money expenses of developing the power, was such that its use insured the development of a power giving the greatest horse-power per dollar of expense. In reality it was synonymous with the determination of the mean effective pressure for greatest economy, and, of course, a variation in compression would effect this mean effective pressure just as well as a variation in expansion, and thus the change by compression possesses no advantage on this score. The disadvantages it has, of probable efficiency of fluid, and without doubt less range of power, we have already referred to. Certainly the new mode of regulation proposed, has no disadvantages on the score of contributing to the more economical running of engines.

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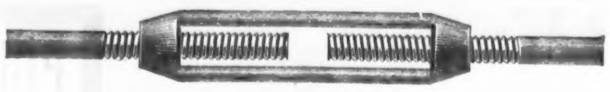
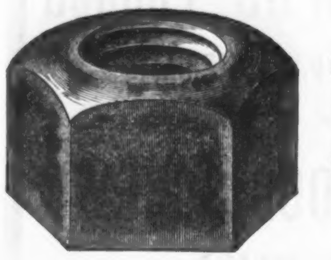
And Index to Advertisements.





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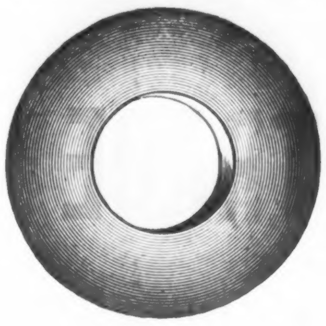

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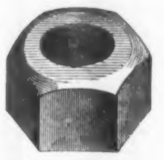

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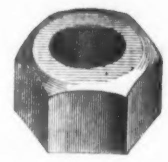

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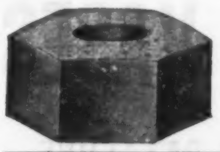

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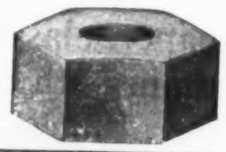

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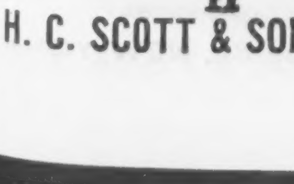

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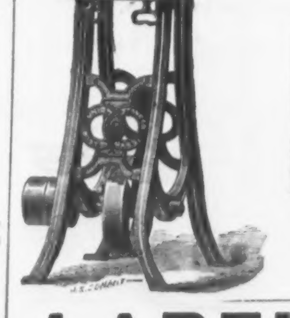

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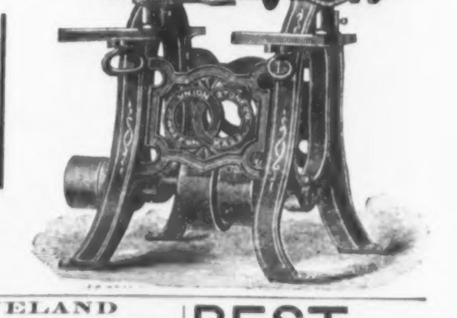

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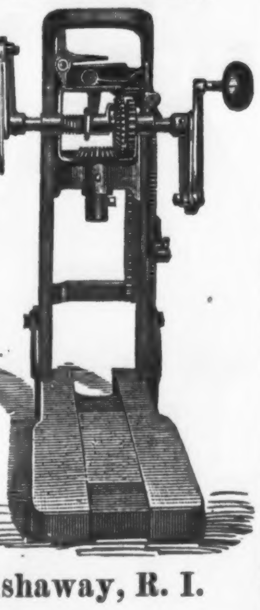

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Ship Builders, House Builders, Dock Builders, Bridge Builders, Carpenters and *Farmers* please notice what we claim for our machine, and we guarantee all thatwe claim: First, that it will do nearly double the work of any other machine in the same length of time, with greater ease to the operator; that we can regulate the speed of the bit according to the size of the same, or to suit the operator; it will drive the bit any required speed; it will drive the bit or auger to any required depth, and the bit or auger returns from the hole by the same automatic motion without the operator stopping the machine; at the same time clearing itself and leaving the hole entirely free from chips; it is gauged to bore such a depth as may suit the operator, boring two or more holes at exactly the same depth after being once set, without any attention from the operator; it is an angular machine and will bore on any angle: it is the most compact machine; it can be placed in so small a compass as to occupy but little room in a carpenter's tool chest, and while in this compact form it can be carriedin the hand with the greatest ease and convenience; it is the most durable machine, from the fact that we use the best material in its construction, and each part can be duplicatedin case of accident by sending directly to us. We finish the ironwork with a baked or heated Japan finish which enables it to withstand all kinds of weather, the woodwork being rubbed in oil and shellaced. They are the cheapest Boring Machines in the world for what they can do. We are introducing the Gladwin Improved Auger in connection with this machine. This auger is the best Boring Machine Auger made, being a self-clearer in gummy or knotty wood. We offer the Borer, boxed and delivered on board cars, for **$6.** with full set Gladwin Improved Augers, 18 qrs., **$9;** or with extra finished beds, **$6.50,** and full set augers, 18 qrs., **$9.50.** A discount given for large orders. Send for Descriptive Catalogue.

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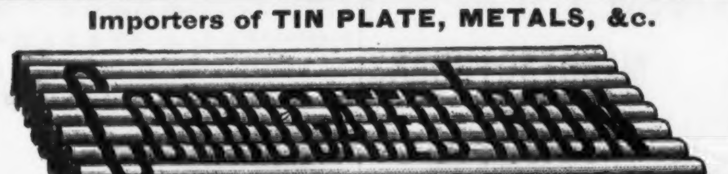

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Iron Clad Can Trimmings, Solder, &c.

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GENUINE BRONZE, BRASS, AMERICAN BRONZED AND JAPANNED
HARDWARE,
Rim and Mortise Locks, Knobs and Escutcheons,
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STATIONERS' HARDWARE, &c.,
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WITH SHELL EJECTOR
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E. REMINGTON & SONS,
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WROUGHT IRON TACKLE BLOCKS.
Swivel Hooks for Rope or Chain,
POLISHED GROOVES, ALL SIZES IN STOCK.
Also Pulley Blocks for Wire Rope,
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Improved Champion Dump Scraper.

We are the exclusive manufacturers of

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We manufacture the only successful Automatic Scraper in the world. Our Dumps are the lightest and strongest scrapers made. We use two pieces of steel pressed into shape, which is superior to the old method of using but one piece, for when that breaks the whole scraper is ruined, while ours is so constructed that we can replace any part at a trifling expense. We make three sizes, to meet the wants of all classes of Earth Workers. Especially suited for Contractors and Township Road Work. Send for circulars. Manufactured by

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CLEVELAND FLUE CLEANER MANUFACTURING CO.,

The most simple, durable and economical steam flue cleaner.

It saves from 15 to 25 per cent. in labor and fuel.

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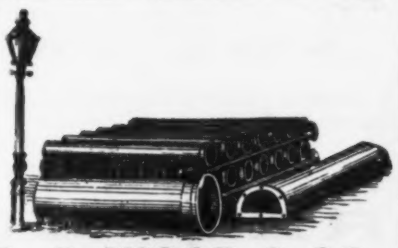

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Manufacturers of
Cast Iron Pipe
FOR WATER AND GAS,
Lamp Posts, Valves, &c.,
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400 CHESTNUT STREET.

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Wagon Tire Upsetter.
The Cheapest and Best.
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164 FULTON ST.,
NEW YORK.

MACHINERY FOR
Straightening and Cutting Wire
Of all Sizes to any Length.
Send for Catalogue.
JOHN ADT.
New Haven, Conn., U. S. A.

Prouty's Patent
PEERLESS FORCE PUMP.
Has Self-Adjustable Foot Rest.

NEW AUTOMATIC COMPENSATING PACKING.

It will throw a continuous jet FROM FORTY TO SIXTY FEET. A new pattern jet and spray nozzle is sent with each pump.

Especial attention is called to the material and workmanship exhibited in these pumps.

LIST PRICE, $8.

THE NEW ENGLAND BUTT CO.
PROVIDENCE, R. I.
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THE AMERICAN BOLT AND SCREW CASE CO.,
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MANUFACTURERS OF
REVOLVING BOLT AND SCREW CASES.

We are the only manufacturers of Bolt cases and the only parties who make lists of Bolt or Screw Cases to suit stock of purchaser without extra charge. All goods guaranteed Send for Illustrated Circular.

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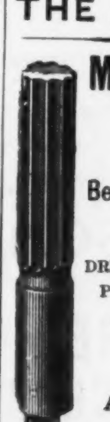
We are also extensive manufacturers of **Fruit Can Sealing Wax.** Send for Circulars and Prices.

Very Respectfully,

THE AMERICAN BOLT & SCREW CASE CO.



MORSE TWIST DRILL AND MACHINE CO.
NEW BEDFORD, MASS., Sole Manufacturers of
Morse Patent Straight-Lip Increase Twist Drill,
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DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL PRESSES. BEACH'S PATENT SELF-CENTERING CHUCKS, CENTER AND ADJUSTABLE DRILL CHUCKS, SOLID AND SHELL REAMERS DRILL GRINDING MACHINES. TAPER REAMERS, MILLING CUTTERS AND SPECIAL TOOLS TO ORDER.

All Tools exact to Whitworth Standard Gauges.

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Successors to Milo Peck, Manufacturers of

PECK'S DROP PRESS

PECK'S DROP LIFTER is the only one which has its parts cushioned. Being thus cushioned they are the most durable Lifter in the market.

Can be attached to any drop now in use.

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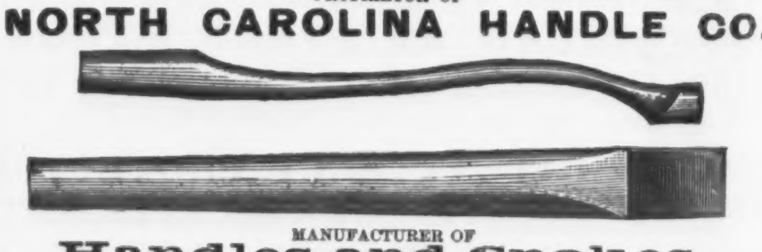
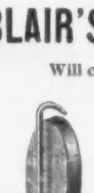
V. G. HUNDLEY,
PROPRIETOR OF
NORTH CAROLINA HANDLE CO.



MANUFACTURER OF
Handles and Spokes.
79 Reade Street and 97 Chambers Street, - - - - NEW YORK.
HARDWARE COMMISSION MERCHANT.

BLAIR'S PATENT BOSS HOG AND PIG RINGER.
Will close almost all kinds wire rings. The most economical to buy, to sell and to use.

Fruit Jar Caps and Wires, ½ gross in box; price, per gross, 65 cents.



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Corrected Weekly by Lloyd, Supplee & Walton.

Terms, 30 days. For 60 or 90 days, interest added at 10% per cent. per annum.

Anvils.
Peter Wrights, ₰ lb....11 @ 11½c
Over 200 lbs....11¼c
Trenton....10½
Eagle Anvils, American, 10c....dis 20 %

Apple Parers.
Globe Apple Pearers....$6.00 net
Penn Apple Parers....$6.00 net
Lots of 10 to 25 dozen special prices
Bay State Peach Parer....$9 00

Axes.
Hunt's Kentucky and Yankee, per doz....$8.50 @ 9.00
Robert Mann....$8.00 @ 8.50
Richland Chief....$7.50 @ 8.00
Beveled Axes....add 50c net
Double Bit Axes....net $14.50 @ 15.50

Augers and Auger Bits.—New List January 7, 1880
Bates' Nut Augers....dis 45&10 %
Cook's Augers....dis 50&10 %
Watrous' Ship Augers....dis 15 %
Benjamin Pierce Auger Bits....dis 40 %
Griswold Auger Bits....dis 45&10 %
Cook's "....dis 40&10 %
Jennings'....dis 10, 20&10 %
Bonney's Pat. Hol. Augers, list $48 ₰ doz. dis 20&10 %
Stearns' Pat. Hol. Augers, list $48 ₰ doz. dis 20&10 %

Balances.
Light and Common....dis 15&10 %

Bells.
Bevin Bros. Mfg. Co. Light Hand Bells....dis 70 %
Swiss Pattern Hand Bells....low list dis 20&10 %
Connell's Door Bells....dis 15 & 10
Gt. Western & Kentucky Cow new list....dis 60

Boring Machines.
Upright, without Augers....List 5.50 } dis 15@50 %
Angular, without Augers....6.75

Bolts.—Eastern Carriage Bolts....dis 80 @ 80 & 10 %
Philadelphia....new list dis 70&10 %
Stanley, Wrought Shutter....dis 50&10 %

Braces.—Barber's....dis 40&5 %
Backus....dis 50 %
Spofford....dis 50&5 %
American Ball....dis 55 %

Butts.—Cast Fast Joint, Narrow....dis 45&10 %
" " Broad....dis 55&10 %
Cast Loose Joint, Narrow....dis 55&10 %
" Broad....dis 55&10 %
" Acorn, Loose Pin....dis 55&10 %
" " Jap'd....dis 60&10 %
" Mayer's Loose Joint....dis 60&10 %
Wrought Loose Pin....dis 55&10 %
" Table Hinges and Back Flaps....dis 60&10 %
" Narrow, Fast....dis 60&10 %
" Loose Joint....dis 55&10 %

Blind Butts.
Parker....dis 70 & 2 %
Clark....dis 70 & 2 %
Shepard....dis 70 %
Lull & Porter....dis 60&10 %
Huffer's....dis 50 %

Chains.—German Halter and Coil list December 31 1881....dis 40 @ 50 %
Galvanized Pump....₰ lb 9¼c net
Best Proof Coil Chain—English.
₰ lb....13 10 8¼ 7¾ 7¼ 7 gold
3-16 ¼ 5-16 ⅜ 7-16 ½ in.

Chisels.—Socket Framing....dis 60&10 %
Socket Firmer....dis 60&10 %
Butcher's....$5.00 to $ gold

Casters.—Bed (new list July 1, 1880)....dis 40@50 %
Plate....dis 40@50 %

Coffee Mills.—Box and Side, new list Jan. 1, 1880....dis 45 %
Enterprise....dis 25 %

Cutlery.—Walden Pocket....new list net
Penna. Knife Co....new list net
Landers, Frary & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net.

Drawing Knives.
Hart Mfg. Co.'s....dis 60&10 %
Adjustable Handle....dis 20 %

Fry Pans.
Tinned....dis 45 %
₰ doz. $3.50 4.00 4.50 5.00 5.50 6.50 7.50 9.00 10.00
No.... 0 1 2 3 4 5 6 7 8
Burnished....dis 60, 10 & 5 %
₰ doz. $3.00 3.75 4.25 4.75 5.25 6.00 7.00 8.00 9.00
No.... 0 1 2 3 4 5 6 7 8

Files.
Nicholson....dis 40 %
Disston....dis 50 %
Butcher....

Fluting Machines.
Eagle—3½ in. roll....each, $2.15 } dis 25 %
" 2.85
Crown—3½ in. roll....3.40 } dis 25 %
" —4 in. roll....5.00
" —8 in. roll....0.50
Geneva Fluter....
Favorite com. Fluter & Sad Iron....₰ doz $20.50 net

Hammers.
Yerkes & Plumb's, new list....dis 30 %
Maydole Hammers....dis 15 %
Howell & E. Nail Hammers....per doz. net $3.75

Handles.
Disston Loop Handles Crosscut....13c pair net
Boynton Loop Handles Crosscut....13c pair net

Hatchets.
Yerkes & Plumb, new list....dis 30 %
Hunt....dis 25 %

Hinges.
Strap and T....dis 55 & 10 %

Horse Nails. Nos. 5 6 7 8 9 10
Globe....24 21 19 18 17 16 dis 12½ %
Vulcan....26 23 21 20 19 18 dis 12½ %
Ausable....30 27 25 24 23 22 dis 20&10 %
" Pol'ed and F't'd
" & Blued & F't'd...31 28 26 25 24 23 dis 10&10 %
Clinton....21 21 20 19 18 dis 10&10 %
" Polished & Pointed...24 22 21 20 19 dis 10&10 %

Hay and Straw Knives.
Lightning....per doz. net $18.00
Electric....18.00
Wadsworth....10.50
Walton Straw Knives....17 00

Locks and Knobs.
Branford....new list dis 45, 10& 2 % cash
Gaylord Cabinet....dis 25&2 % cash
American Padlocks....dis 30, 10&2 % cash
Scandinavian Padlocks....dis 50 %
₰ doz. $4.00 5.50 6.50 7.50 8.50 10.00 12.00 } dis 60 %
No.... 57 58 59 60 61 62 63
₰ doz....$18.00 26.00 33.00 } dis 60 %
No.... 64 65 66

Lanterns.
Buckeye....Large list net; small list net
Tubular....No. 0, $8.65; No. 1, $10.15 ₰ doz net
Guards, 35 cents extra per doz. net.

Lawn Mowers.—Pennsylvania.... } new list
Philadelphia....
Excelsior....dis 30 %

Lawn and Garden Pumps.
Holland Patent....List $5.00 dis 10 %

Mattocks.
Long and Short Cutter....new list....45 %
Pennsylvania Pattern....dis 4 %

Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets....dis 25 %
Stebbins' Gates....dis 70&10 %
Lincoln's....dis 10&10 %
Landers, Frary & Clark's Petroleum....dis 45 %
Brass Liquor Cocks, new list Jan. 1 1882....dis 70 %
Cork Lined....dis 70 %

Meat Cutters.
Dixon's....dis 25&5 %
Woodruff....dis 25&5 %
Stowe....dis 25&5 %
Hale's....new list, dis 50, 10&2 cash
American....dis 25 %
Uttermore....dis 25&5 %
Stuffers....dis 25 %
Enterprise Stuffers....dis 20 %

Planes.—Sandusky Tool Co....dis 25 %
Ogonts....dis 25 %
Ohio & Auburn....dis 20 %
Bailey (S. R. & L. Co.)....dis 20&10 %

Plane Irons.—Ohio Tool Co....dis. 20 %
Butcher's....$5.00

Plumbs and Levels.
Stanley's Adjustable....dis 60&10 %
" Non-Adjustable....dis 60&10 %

Picks.—New list....dis 40 %

Razor Strops.
Lamont Combination....per doz. $4.00
Imitation Emerson....per doz. 2.00

Rules.—Stanley Boxwood....dis 70&10 %
Stanley Ivory....dis 60&10 %

Steelyards.—Hart's Pattern....dis 33⅓&10 %
₰ doz....$22.50 27.75 32.00 26.50 31.00 35.50
Lbs....50 100 150 200 250 300
American Pattern....dis 33⅓&10 %
₰ doz....$8.00 10.25 13.75 19.50 18.75 19.50
Lbs....50 100 150 200 250 300

Squares.
Steel and Iron...dis 50; full case. dis 40&10 % for cash
Try Squares, Stanley....dis 40&10 %
Disston's Try Squares....dis 40 %

Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened....₰ doz $9.00
Clipper No. 10, Bronzed Blade, Boxed and Sharpened....₰ doz $8.50 } 30
Clipper No. 5, Painted Red, Boxed and Sharpened....₰ doz $8.00

Saws.—Disston's Hand, Panel and Rip....dis 20 %
Disston's Circular....dis 40 %
" Cross-Cut No. 2, Plain Tooth....dis 40 %
" " Patent Tooth....dis 40 %
" " Champion Tooth....dis 40 %
Boynton's Lightning Cross Cut, new list....dis 40 %
" Lightning Buck Saws, cross bar....dis 40 %

Shovels and Spades.
Oliver Ames & Sons, new list....dis 15 %
Griffiths....dis 50&5 %
Rowland....dis 50&5 %

Sad Irons.—2 to 10 lbs....3½c
Mrs. Potts' Patent....dis 35 %

Stones.
Washita Extra....₰ lb 28c net
" No. 1....18c
" No. 2....16c
" Slips....37c
" Axe....19c net
Hindostan Oil Stone No. 1....₰ lb 6c
" Axe Stone....dis 33⅓ %
" Slips....

Screws.
Flat Head Iron, new list Dec. 27....dis 65 & 10 %
Flat Head Brass, new list Dec. 27....dis 50 & 5 %
Round Head Brass, new list Dec. 27....dis. 40 & 10 %
Round Head Iron, new list Dec. 27....dis. 45 & 10 %

Spoons.
Plated....dis 40, 10 & 5 %
German Silver....dis 30 & 10 %
Britannia, Boardman's....dis 60 %
" Parker's....dis 60&10 %
Tinned....dis 10 %

Springs.—Torrey....dis 50 %
Gem No. 3 small Jap'd....$2.00 } dis 50 & 10 %
" No. 2 medium Jap'd....2.75
Coil No. 10, per gross net....$6.00
Other Standard Springs....dis 50&10 %
Warner Door Springs, per doz. net....1.75
Standard Spring Hinges—
Single No. 0, per doz. net....1.25
" No. 1. " "....1.50
Other Standard Spring Hinges....dis 25&10 %

Stocks and Dies.....dis 10&5 %

Stove Polish.—Gem....₰ gross, $4.50, dis 5 %
Dixon....6.00, dis 10 %
Fire Fly....$3.00 gross net

Tacks.....dis 30&10 %
Shoe Nails—4-8, and over 8c....} 10 %
" " 3½-8, and under 9c....
Double Pointed Tacks....dis 40&5 %

Traps.
Genuine Oneida—Newhouse....dis 35 %
Im. Oneida—Newhouse list, first qual. dis 55&5 @ 60 %

Vises.—Solid Box. Trenton new list....dis 35 %

Wrenches.—Agricultural....dis 70 %
Coes' Genuine....dis. 50&3 %
Coes' Mechanics'....dis. 50&10&3 %
" " Mall. Bar....dis 75 %

Wire.
Bright or Ann'd, No. 0 to 18....dis 52½ to 55 %
" No. 19 to 26....dis 60 to 62½ %
" " No. 27 to 36....dis 65 to 67½ %
Coppered, 0 to 18....dis 47½ to 50 %
Tinned Broom Wire....dis 55 to 57½ %
Galvanized Barb Wire....9cts
Painted Barb Wire....8c
Galvanized No. 7 to 18....Market List, dis 42½ to 45 %

Wringers.
Peerless No. 2½....$42.00
" No. 2....45.00
Universal No. 2½....42.00
" No. 2....45.00
Novelty No. 2, for common tubs....42 00
" No. 3, " "....48.00
Excelsior E, for stationary tubs....51.00
" F " "....57 00
In lots of 1 doz. $3.00 doz. dis. from above price.

PITTSBURGH.

Merchant Iron.

TERMS.—Note or acceptance at 60 days, with current rate of exchange on New York, or a discount of 2 per cent. for cash, if remitted within 10 days from date of invoice.

For fluctuations and discounts on card rates see weekly Pittsburgh Trade Report.

The following are card rates.

Flat Bar.
1½ to 4 by ⅜ to 1 inch....2.5c
4¼ to 6 by ⅜ to 1 "....2.6c
1⅜ to 6 by 1⅛ to 1¼ "....2.9c
1¼ and 1⅜ by ⅜ to ¾ "....2.6c
1 and 1⅛ by ⅜ to ¾ "....2.7c
⅝, ¾ and ⅞ by ⅜ to ⅝ inch....2.9c

Rounds and Squares.
1 to 1⅞....2.5c | ⅝ to 9-16....2.7c
2 to 2⅝....2.7c | ½ to 7-16....2.9c
2¾ to 3¼....3.0c | ⅜....3.1c
3⅜ to 4....3.5c | 5-16....3.3c
4¼ to 5....4.0c | ¼....3.5c
⅝ to ⅞....2.6c | 3-16....5.5c

Oval Iron.
⅞ to 1½....2.9c | ½....3.3c
⅝ to ¾....3.1c | ⅜....3.7c

Half Oval and Half Round.
⅞ to 1¼ inch....3.2c | ½ inch....4.0c
⅝ to ¾ "....3.7c | ⅜ "....5.5c

Horse Shoe.
⅝ to 1⅛ by 5-16 to ⅞ inch....3.5c

Wagon Box Iron.
⅞ Inch Nos. 13 and 14....3.7c
⅞ " " 11 and 12....3.5c
¾ " " 13 and 14....4.0c
¾ " " 11 and 12....3.8c
⅝ " " 13 and 14....4.4c
⅝ " " 11 and 12....4.1c

Heavy Bands.
3½ to 6 by ¼ and 5-16 inch....2.7c
1⅞ to 3¼ by ¼ and 5-16 "....2.7c
1 to 1⅝ by ¼ and 5-16 "....2.8c
¾ to ⅞ by ¼ and 5-16 "....3.0c
⅝ and ½ by ¼ and 5-16 "....3.5c

Light Bands.
1⅞ to 6 by ⅛ to 3-16....3.0c
1⅞ to 6 by Nos. 11 and 12....3.1c
1 to 1¾ by ⅛ to 3-16....3.1c
1 to 1¾ by Nos. 11 and 12....3.2c
⅞ and 13-16 by ⅛ to 3-16....3.4c
⅞ and 13-16 by Nos. 11 and 12....3.5c
¾ and 11-16 by ⅛ to 3-16....3.7c
¾ and 11-16 by Nos. 11 and 12....3.8c
⅝ and 9-16 by ⅛ to 3-16....4.0c
⅝ and 9-16 by Nos. 11 and 12....4.1c
½ inch by ⅛ and 3-16....4.3c
½ inch by Nos. 11 and 12....4.4c

Hoop Iron.
1¼ to 4, Nos. 13, 14 and 15....3.3c
1¼ to 2, Nos. 16, 17 and 18....3.4c
1¼ to 2, No. 19....3.5c
1¼ to 2, No. 20....3.6c
1¼ to 2, No. 21....3.7c
1¼ to 2, No. 22....3.8c
15-16, 1, and 1⅛, Nos. 13, 14 and 15....3.5c
15-16, 1, and 1⅛, Nos. 16, 17 and 18....3.6c
15-16, 1, and 1⅛, Nos. 19 and 20....3.7c
15-16, 1, and 1⅛, No. 21....3.8c
15-16, 1, and 1⅛, No. 22....3.9c
⅞, Nos. 13, 14 and 15....3.7c
⅞, Nos. 16, 17 and 18....3.8c
⅞, Nos. 19 and 20....3.9c
⅞, No. 21....4.0c
⅞, No. 22....4.1c
13-16 Nos. 13, 14 and 15....3.9c
13-16, Nos. 16, 17 and 18....4.0c
13-16, Nos. 19 and 20....4.1c
13-16, No. 21....4.2c
13-16, No. 22....4.3c
¾, Nos. 13, 14 and 15....4.0c
¾, Nos. 16, 17 and 18....4.1c
¾, Nos. 19 and 20....4.2c
¾, No. 21....4.3c
¾, No. 22....4.4c
11-16, Nos. 13, 14 and 15....4.2c
11-16, Nos. 16, 17 and 18....4.3c
11-16, Nos. 19 and 20....4.4c
11-16, No. 21....4.5c
11-16, No. 22....4.6c
⅝, Nos. 13, 14 and 15....4.4c
⅝, Nos. 16, 17 and 18....4.5c
⅝, Nos. 19 and 20....4.6c
⅝, No. 21....4.7c
⅝, No. 22....4.8c
⅝, No. 23....4.9c
9-16, Nos. 13, 14 and 15....4.6c
9-16, Nos. 16, 17 and 18....4.7c
9-16, Nos. 19 and 20....4.8c
9-16, No. 21....4.9c
9-16, No. 22....5.0c
9-16, No. 23....5.1c
½ inch, Nos. 13, 14 and 15....4.8c
½ " Nos. 16, 17 and 18....4.9c
½ " Nos. 19 and 20....5.1c
½ " No. 21....5.2c
½ " No. 22....5.3c
½ " No. 23....5.4c

The prices under Hoop Iron do not apply to Cotton Ties.

1-10c per lb. extra will be charged for each gauge lighter than the lightest indicated.

1-10c per lb. extra will be charged for cutting Hoops to specified lengths.

Barrel Hoops.
1¼ to 2 in., cut to length.
9 to 11 lbs. per set of 6 hoops....3.5c
8 lbs. and less than 9 lbs. per set of 6 hoops....3.6c
Less than lbs. per set of 6 hoops....3.8c

Extras for Cutting to Length all Preceding Iron.
All Iron, including Tire....1.10c

Tank Iron.
No. 9 and heavier....3.3c
Plow Slabs....3.5c
" Wings....3.8c

Sheet Iron.

	Common.	Charcoal.	Juniata.
No. 10 to 14	3.5c	5.0c	6.5c
No. 15 to 17	3.8c	5.3c	6.8c
No. 18 to 21	4.1c	5.6c	7.1c
No. 22 to 24	4.3c	5.8c	7.3c
No. 25 & 26	4.5c	6.0c	7.5c
No. 27	4.7c	6.2c	7.7c
No. 28	5.1c	6.6c	8.1c

All sheets No. 18 and lighter, over 30 inches wide, not less than 2.10c extra.

Wood's Patent Planished Sheet.
1st quality (A)....10½c | 2d quality (B)....9 c

Galvanized C. H. B.—(Charcoal Hammered Blooms.
Nos. 14 to 20....12c | No. 27....15c
Nos. 21 to 24....13c | No. 28....16c
Nos. 25 and 26....14c | No. 29....18c
45 @ 47½ % discount.

Coal Screen Iron.
1⅜ by ⅜ by 5-16....3.0c | 1 by ⅜ by 5-16....3.5c

Angle Iron.
2½, 3, 3½ and 4 inch....3.3c
1½, 1¾ 2 and 2¼ inch....3.3c
1¼ inch....3.4c
1 "....3.6c
1½ by 1 inch, for Plow Handles....3.8c
1½ by ¾ " "....3.8c
1⅜ by ⅝ " "....3.9c

T Rail.
8 lbs. to the yard....2.9c | 20 lbs. to the yard....2.8c
12 " "....2.8c | 28....2.8c
16 " "....2.8c | 30....2.8c

Splice Joints for 12, 16 and 20-lb. Rail, 40c each; 28 and 30 lb. Rail, 50c each; 40 lb., 60c each.
3½ by ⅜ and ½ Spikes for 20 and 28-lb. Rail....3⅝c
2½ and 3 by ⅜ " " 12 and 16-lb. "....4c
2½ by 5 16 " " 8-lb. Rail....4½c

Flat Rails.—Punched and Countersunk.
1½ to 2 by ½ to ⅝ inch....3.0c
1½ by ⅜ and 7-16 inch....3.2c
1¼ by ⅜, 7-16 and ½ inch....3.5c

Juniata Nail Rods....6.5c
Norway "....8.0c
Guard Iron ⅜x¾x⅜ and ½x⅜x⅝....4.0c
" ⅝x⅝x9 16 and ⅝x⅝x⅞....4.2c
Drag Bars....3.3c
Dropper Bars....3.8c
Cylinder and Landside Iron....3.2c
Plow Beam Iron....3.0c

Nails.
See Pittsburgh Trade Report.

Best Quality Refined Cast Steel.

Square, Flat, Octagon and Round.
⅜ to 2 inches, inclusive....10½c
1-16 and 2⅛ to 3 inches....11½c
¼ and 3⅛ to 4 "....12½c
7-32 and 4⅛ to 5 "....13½c
3-16 and 5⅛ to 6 "....16c
5-32 inch....21c
⅛ inch....30c
Oil Well Steel Forgings....20c

Machinery Steel.

	Crucible.	Bessemer & Open Hearth
Ordinary Sizes, ⅜ to 2 inch Round	6c	9c
5-16 and 2⅛ to 3 inches	7c	6c
¼ and 3⅛ to 6 "	8c	7c
7-32 inch	10c	8c
3-16 "	12c	10c

Square, Flat and Octagon, ½c extra throughout the list.

Cut to specified lengths, ½c extra.

Hammer Cast Steel.
Crucible Cast Steel....7c
Open Hearth Cast Steel....6c

Sheet Steel.—Crucible.

	Best.	2d Qual.	3d Qual.	Bessemer & Open Hearth.
To 21 gauge	12c	11c	9c	7c

1c. extra for each additional gauge.
Cut to multiples or specified lengths, ½c. extra.

Miscellaneous Cast Steel.
Auger and Auger Bit....7c
Axle Steel for carriages and wagons....7c
Frog Points and Plates....7c
" Side Bars....6c
Pick, plain (hammered)....8c
" and Mattock, beveled (rolled)....7c
Skate Steel....7c
Table Cutlery, plain....6c
Table Cutlery, beveled....6½c
Pike and Cant Hook....8c
Coal and Granite Wedge....8c
Roller....8c
Spindle, subject to Machinery classification....8c
Trap Spring Steel....9c
Forged Crank Pins and Lathe Spindles....9c
Piston Rods, plain....7c
" forged to shapes....9c
Slide Bars, plain....8c
" forged to shapes....5c

Crucible, Open Hearth or Bessemer
Boiler, Fire-Box and Flue Sheets, not less than 3 16 thick....6c
Boiler, Fire-Box and Flue Sheets, not less than ⅛ thick....7c
Circulars and semi-circulars, when ordered separately....8c
Smoke Stack, to shape....7c
Locomotive Tank Steel....6c

File Cast Steel.
Square, Round, Half Round and Flat Bastard, 8-inch and over....8c
Mill Saw, 8-inch and over....8½c
Taper, 3½-inch and over....9½c
Horse and Shoe Rasp....6½c

Spring Cast Steel....6½c
Spiral and Taper, cut to lengths....7c

Tire Cast Steel.
1x½ and over....8½c
1x3-16, ⅞x3-16 and ⅜....9c
1 and 11-16x⅛ and 5-32, ⅞x3-16 and 5-32....9½c
¾ and ⅝x⅛ and 3-32 and 12 g....11c
Solid Safe Cast Steel....7½c
Three and Five Ply Cast Steel....10c

Agricultural Implement Cast Steel.
Fork and Rake, Crucible....6c
Horse Rake Steel, cut to lengths, Crucible....7c
Hoe, Crucible....6c
Corn Stalk Cutter, beveled....7½c
Beveled Hoe and Shovel Steel in Bars....7c
Crucible Plow Steel in slabs....6c

Bessemer and Open Hearth.
Spring....4½c
" spiral and taper, cut to lengths....5½c
Tire, 3-16 thick and above....4½c
Toe Calk....4½c
Plow....4½c
Axle Billets....4c
Sleigh Shoe....4c
Cutter Shoe, cut to lengths and tapered....5½c
Scythe Back Steel....4c
Grain Drill Bars....6c
" Points....7c
Rolling Coulter Blanks, cut and punched....9½c
Thrasher Steel....4½c
" Teeth....5½c
Rolled Hammer Billets....4½c

Terms.—Four months: 2 per cent. discount for cash, if remitted within 30 days.

Rolls and Castings.
Furnace Floor and Straightening Plates....1¾c
Housings and Castings not otherwise specified....2¾c
Guide Plates....3¼c
Spindles and coupling boxes....2½c
Sand Rolls and Pinions, large size....3 c
" small size....3½c
Pipe Mill Castings....5 c
Rolling Mill Castings under 50 lbs....4 c
Spur and Bevel Wheels, large....4 c
" small....4½c
Pulleys up to 30 inches....4½c
" over 30 inches....4 c
Engine Castings, light....4½c
" " heavy....4 c

Chilled Rolls.
6 to in. diam., to 20 in. long....4½c
8 to 15 in. " 8 to 40 in. "....4½c
25 to 24 in. " 15 to 72 in. "....4c
14 to 31 in. 72 to 108 in. "....4c

After Oct. 1, 1881, no discounts will be made at settlement as heretofore, prices quoted being net.

White and Red Lead.

Strictly Pure White Lead in Oil, in kegs, 6½c.; in 25 lb Tin Pails, ½c. ₰ lb over keg price; 12½ lb Tin Pails, 1c ₰ lb over keg price; assorted, 1 to 5 lb cans, 3c. per lb over keg price.
Dry White Lead in barrels....6½c
Red Lead, very brilliant, in kegs, 6½c; in barrels 6¼c
Litharge (Potter's Lead) " 6½c; 6¼c

Freights equalized with all points where White Lead is made.

Terms: Note at sixty days, or if paid within 15 days from date of invoice a discount of 2½ per cent. will be allowed, but not otherwise.

Window Glass.

Discount, 70 % on Single Strength, 70 & 10 % on Double.

Size.	AA.	A	B.	C.
Single Strength.				
6 x 8 to 10 x 15	$8.25	$7.50	$7.00	$6.50
11 x 14 to 16 x 24	9.25	8.50	8.00	7.25
18 x 22 to 20 x 30	10.75	9.75	8.75	7.75
15 x 36 to 24 x 30	12.25	10.75	9.00	8.50
26 x 28 to 24 x 36	13.00	11.50	9.75	9.00
26 x 36 to 26 x 44	14.50	13.25	10.75	9.50
26 x 46 to 30 x 50	15.00	14.00	11.25	10.50
30 x 52 to 30 x 54	16.00	14 50	12.00	
30 x 56 to 34 x 56	17.25	15.50	13.50	
34 x 58 to 34 x 60	18.25	17.25	15.00	
36 x 60 to 40 x 60	20.75	18.75	17.25	
Double Strength.				
6 x 8 to 10 x 15	12.75	11.75	10.75	10.00
11 x 14 to 16 x 24	14.50	13.25	12.50	11.25
18 x 22 to 20 x 30	17.25	15.75	14.00	
15 x 36 to 24 x 30	19.75	17.25	14.50	
26 x 28 to 24 x 36	21.00	18.50	15.75	
26 x 36 to 20 x 44	23.25	21.25	17.25	
26 x 46 to 30 x 50	24.00	22.50	18.00	
30 x 52 to 30 x 54	25.75	23.25	19.25	
30 x 50 to 34 x 56	27.75	25.00	21.75	
34 x 58 to 34 x 60	29.25	27.75	24.00	
36 x 60 to 40 x 60	33.25	30.00	27.75	

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length and not making more than 81 united inches, will be charged in the 84 united inches bracket.

Hubbard, Bakewell & Co.'s Goods.
Axes, Single Bit, Lippincott....Per doz. $8.00
" " James & Co.... " 7.00
" Double Bit, Lippincott.... " 15.00
" " James & Co.... " 12.00
Drain Tools, list....dis 20%
Hoes, Planters'....dis 55%
" Scovill Pattern....dis 55%
" Handled, Square Eye, German....dis 25%
Handles, Cross Cut....Per doz. $3.50
" Shovel, Bent, Bored, Riveted.. " 2.50
Saws, Circular....dis 45%
" Long....dis 40%
" Cross Cut, H. B. & Co., Champion, Per ft. net....$0.35
" Cross Cut, Lippincott, Champion, Per ft. net....30
Shovels, list....dis 20%
Spades, "....dis 20%
Scoops, "....dis 20%

BOSTON.

Reported by Macomber, Bigelow & Dowse.

Anvil & Vise.—
No. 1, $6.25; 2, 4.25; 3, 3.50 each....dis 25 %
Augers & Bits.—Snell's Auger....dis 40&10 %
L'Hommedieu's Ship Auger....dis 25 %
Jenning's Bitts....dis 10&10&10 %
Cook's Bitts....dis 30 %
Shepardson's Double-Cut Bitts....dis 45 %
Shepardson's Double Gimlets....dis 40 %
Steam's Extension Hollow Augers—
No. 2, ₱ doz., $48.00; No. 3, ₱ doz., $60.00 list..dis 20 %
Bonney's Extension Hollow Augers....₱ doz. $36.00
Pierce's Bitts....dis 25 %
Griswold Bitts....dis 60 %
Axes.—Blue Jackets....₱ doz $8.50
Red Cross....₱ doz 8.00
Red Cross Handled....₱ doz 12.00
Down Handled Boys'....dis 33⅓ %
Ax Handles.—
Oak Extra, 35 in., No. A....₱ doz $2.50
Oak Extra, 32 in., No. A....₱ doz 2.00
Oak Extra, 35 in., No. B....₱ doz 2.00
Oak Extra, 32 in., No. B....₱ doz 2.00
Oak Extra, 31 or 34 in., No. C....₱ doz 1.25
Axle Clips....dis 50 %
Balances.—Chatillon's....dis 33⅓ %
Barn Door Rail.—
Cast Angle (for Anti-Friction Hangers....₱ ft. 3c
Cast Half Round....₱ ft. [illegible]
Wrought Round....₱ ft. [illegible]
Bells.—Connel's Crank Gong, reduced list..dis 15&10 %
Bird Cages.—
Japanned, M. B. & D., reduced list, 1879....dis 20 %
Brass M. B. & D., reduced list 1879....dis 33⅓ %
Blind Fasts.—Lock Fasts....₱ C sets $6.00
No. 6 Fasts....₱ C sets 6.00
Veazie Fasts....₱ C sets 5.50
Shedd's....₱ C sets 7.00
Blind Hinges.—Mall. Hook, 3 holes....₱ C sets 7.00
Brad Awl Handles.—
Phoenix Adjustable....₱ doz $2.00
Bolts.—Norway Iron Carriage....dis 75 %
Common Iron Carriage....dis 80 %
Borax.—Refined....₱ lb 12c
Boring Machines.—
Eagle Upright each....$5.50 list; dis 40&10 %
Eagle Angle each....6.75 list
Snell Augers....₱ set $2.45
Braces.—Barber's....dis 50 %
Spofford's....dis 40&5 %
Backus'....dis 40&5 %
Bracket Saws.—Holly Scroll Saw....each $2.25
Demas Lathe and Scroll Saw....each 6.50
Bracket Saws, extra quality, to No. 5....₱ gro 0.75
Steel Frame, with patterns....₱ doz 6.50
Lester....dis 20 %
New Rogers, all iron....dis 25 %
Bracket Saw Blades.—Griffith's pat....₱ gross 750
Brackets.—
H. B. & M. Flower Pot, reduced list....dis ½&10 %
Bronzed Shelf, M. B. & D., new list....dis 40 %
Store Shelf....dis 40 %
Butts.—Union Fast Joint....45&10 %
Union Loose Joint....dis 55&10 %
Union Japanned Acorn....dis 55&10 %
Union Silvered Acorn....dis 55&10 %
Union Boston Finish....dis 70&10 %
Union Spiral Spring....dis 25&10 %
Wrought Brass....dis 65& 10%
Carriage Bolts.—Eagle Norway....dis 70&10 %
Common....dis 80 & 5 %
Carriage Jacks.—Climax No. 1....₱ doz $2[illegible].00
Climax No. 1½....₱ doz 15.00
Climax No 2....₱ doz 13.50
Universal....dis 25 %
Universal No. 1....each. $2.00
Universal No. 2....each 3.00
Universal No. 3....each 6.00
Universal No. 4....each 6.00
Universal No. 5....each 6.50
Cartridges.—U. S. Cartridge Co....dis 70 %
Cards.—
Watson's make Horse & Curry....dis 10 %
Watson's Cotton....dis 10 %
Watson's Wool....dis 10 %
(New List, July, 1881.)
Casters.—Bed and Table....dis 50 %
Chain.—Traces 6½, 10, 4, straight....₱ pair 50c
Traces 6½, 10, 4, twisted....₱ pair 55c
Traces 7, 12, 2, twisted....₱ pair 80c
Coil 3-16....₱ lb 10½c
Coil ¼....₱ lb 8½c
Coil 5-16....₱ lb 7c
Coil ⅜....₱ lb 6½c
Coil 7-16....₱ lb 6c
Coil ½....₱ lb 5¾c
Chalk.—White, Carpenter's....₱ gross 60c
Red, Carpenter's....₱ gross 80c
Blue, Carpenter's....₱ gross $1.00
Chisels.—Hart, Bliven & Mead, Framing..dis 60&10&10%
Underhill, Framing....dis 25 %
Buck's Chisels....dis 20 %
Clothes Line.—
Galvanized Wire, 100 feet each....₱ doz $4.00
Coal Hods.—"Dover."—Galvanized, New List.dis 60%
Japanned, new list....dis 60 %
Corks.—Brass. L. F. & Co....dis 50 %
Coffee Mills.—New List....dis 45 %
Copper Rivets....dis 50&10 %
Cordage.—Manila, usual trade dis 10....₱ lb 15½c
Jute....₱ lb 8c
Cow Ties.....dis 33⅓ %
No. 30, 3 ft. No. 6 Wire, with toggle....₱ doz $3.80
No. 35, 3 ft. No. 6 Wire, with snap....₱ doz 4.00
No. 40, 3½ feet No. 6 Wire, with toggle....₱ doz 4.30
No. 45, 3½ ft. No. 6 Wire, with snap....₱ doz 4.50
No. 50, 4 ft. No. 4 Wire, with toggle....₱ doz 4.75
No. 55, 4 ft. No. 4 Wire, with snap....₱ doz 5.00
No. 60, 4½ ft. No. 3 Wire, with toggle....₱ doz 5.60
No. 65, 4½ ft. No. 3 Wire, with snap....₱ doz 5.80
Crow Bars.—Cast Steel....₱ lb 7½c
Iron Steel-pointed....₱ lb 6c

Cutlery.—Pocket American Shear Co.'s....dis 20 %
Butcher Knives Wood's, Lap Bolster, Square Handle....dis 30 %
Steak Knives....dis 25 %
Lap Bolster, Oval Handle....dis 25 %
Sticking....dis 30 %
Skinning....dis 30 %
Butcher, Common Round Handle, Wood's..dis 30 %
Shoe Knives, Wood's....dis 30 %
Dividers.—Cook's....dis 20 %
Dog Collars.....dis 20 %
Door Springs.—Torrey's Rod....₱ doz $1.85
Imitation Torrey's Rod....₱ doz 1.45
Gem Coil, new list....dis 50 & 10 %
Crown....₱ doz 1.25
Warner's....₱ doz 2.00
Door Stops.—Thurston's....dis 50 %
Drawer Knobs.—Thurston's....dis 50 %
Drills.—Morse Bitt Stock....dis 25 %
Morse Straight Shank....dis 40 %
Emery.—Wellington Mills....₱ lb 10c
Walpole Emery Mills....₱ lb 10c
Turkish in 10 lb cans....₱ lb 8c
Enameled Ware.—
Standard Mfg. Co. Kettles....dis 40 & 10 %
Standard Sauce Pans....dis 40 & 10 %
Felloe Plates.—Wrought....₱ lb 5c
Files.—American File Co....dis 40 %
Nicholson File Co....dis 40 %
Fluting Machines.—Knox list, $4.00....dis 25 %
American list, $3.50....dis 25 %
Forks.—W. C. & Co. Manure....dis 25 %
Gimlet Bits.—
Genuine German, No. 125, 1-32 to 8-32, per doz $1.00
Pierce's....per doz .88
Glass Cutters.—Combination Glass Cutter and Knife Sharpener....₱ doz $1.50
Grub Hoes.—K. P. & Co.'s No. 2, $11.50 ₱ doz..dis 50 %
Hammers.—Maydole's....dis 20 %
Eartford Hammer Co....dis 30 %
Hangers & Rollers.—Anti-Friction....dis 40 %
Acme Rollers....dis 40 %
Climax....dis 40 %
Common Hangers....dis 40 %
Common Rollers....dis 40 %
Hand Screws....dis 10 %
Hatchets.—C. F. Dowse new list....dis 30 %
Underhill....dis 30 %
Hay Knives.—Lightning....₱ doz $18.00 net
Fisher's Patent....₱ doz $14.00
Hinges.—Strap and T (new list)....dis 60 %
Providence Plate....dis 60 %
Wrought Screw Hook....₱ lb 5c
Hoes.—W. C. & Co.'s....dis 50 %
Hooks and Staples.—Brewers' (new list)....dis 60 %
Horse Nails.—No. 6, 7, 8, 9
National Finished....25 .21 .20 .19....dis 20 %
Putnam Pointed....24 .22 .21 .20....dis [illegible]
Bridgewater....21 .19 .18 .17....list
Ice Cream Freezers.—Packer's, new list....dis 25 %
Knobs.—"Norwalk." New list....dis 50 %
Silver Glass....dis 50&10 %
Silver Glass Bell Pulls....dis 50 %
Lanterns.—Tubulars, No. 0....₱ doz $5.50
Lawn Mowers.—The "Daisy."
12 in. cut....each $8.00
14 in. cut....each 8.50
16 in. cut....each 9.00
18 in. cut....each 9.50
Lead.—Sheet....₱ lb 7½c
Pipe....₱ lb 6¾c
Locks.—Norwalk....dis 40 %
Eagle Cabinet....dis 15 %
Eagle Trunk....dis 15 %
W. Wilcox & Co., Padlocks....dis 33⅓ %
Manure Forks.—W. C. & Co....dis 25 %
Mattocks.—
K. P. & Co., Long Cutter, $16.00 ₱ doz....dis 50 %
K. P. & Co., Short Cutter, $15.00 ₱ doz....dis 50 %
K. P. & Co., Pick Cutter, $16.00 ₱ doz....dis 50 %
Measuring Tapes.—Eddy's....dis 20 %
Meat Cutters.—Miles' Challenge....dis 20 %
Hale's (new list)....dis 40 & 10 %
American....dis 25 %
Money Drawers.—Tucker's Am....₱ doz $22.00
Mouse Traps.—Delusion....₱ doz [illegible]
Novelty....₱ doz [illegible]
Nails....₱ keg 3.25
Oilers.—Zinc and Tin....dis 40 %
Brass and Copper....dis 40 %
Ox Bows.—Extra finished and varnished....dis 25 %
1¼ in., ₱ doz. pair...$7.00; 2 in., ₱ doz. pair. $9.00
1⅜ in., ₱ doz. pair... 9.00; 2¼ in., ₱ doz. pair. 11.00
Paper.—Tarred Sheathing....₱ lb 2¼c
Tarred Eagle Roofing....₱ lb 2c
Picks.—K. P. & Co., Adze Eye, 5 to 6 lb $12.00..dis 50 %
K. P. & Co., Adze Eye, 6 to 7 lb $13.00....dis 50 %
Planes.—
Fancy Planes....dis 25 %
Bazee Planes....dis 25 %
N. Y. Tool Co....dis 25 %
English Iron....dis 25 %
Bailey's....dis 20&10 %
Plated Ware.—Rogers & Bro....dis 40 %
Pliers.—Vom Cleff & Co.'s....net list
Button's Wire Pliers....dis 33⅓ %
Plumb & Levels.—Stanley R. & L. Co....dis 60&10 %
Pocket Knives.—American Shear Co.'s....dis 20 %
Potato Diggers.—W. C. & Co., reduced list....dis 25 %
Pulleys.—Acme or Excelsior, 1¾ in....₱ doz 25c
Acme or Excelsior, 2 in....₱ doz 27c
Pulley Blocks....dis 35 %
Pumps.—Union Manufacturing Co.
Iron Cistern....dis 50 %
Iron Pitcher Spout....dis 50 %
Copper....dis 50 %
Rivets.—Black (new list)....dis 40 %
Carriage in 10 lb papers (new list)....dis 50 %
Copper....dis 35 %
Razors.—Torrey's....dis 25 %
Razor Straps.—Torrey's....Full line
Rules.—Stanley, Boxwood....dis 70 & 10 %
Stanley, Ivory....dis 20 %
Sad Irons.—Common....₱ lb 3½c
Laundry....₱ lb 3½c
Tailors' Geese....₱ lb 3½c
Enterprise, "Potts"....₱ lb 3¾c
Sash Locks.—King & Hutchinson's, new list..dis 40 %
Sandpaper.—Baeder & Adamson....dis 40 %
H. B. & D....dis 40 %
Sash Weights.—Patent Eye....₱ lb 1¾c
Saws.—Hand Saws, Disston's....dis 25 %
Wheeler & Clemson....dis 25 %
Cross-Cut Saws.
W. M. & Co., Common Tooth, No 1....₱ foot 30c
W. M. & Co., Champion Tooth....₱ foot 40c
Disston's, Common Tooth....₱ foot 30c dis 25 %
Disston's Great American Tooth....₱ foot 60c dis 25 %
Boynton's Lightning Tooth....dis 25 %
M. B. & D., Hand Saws....dis 33⅓ %
W. M. & Co.'s Circular Saws....dis 40 %
Richardson Bros....dis 40 %
Saw Blades.—Disston....dis 40 %
W. M. & C....dis 40 %
Welch & Griffith, Extra....dis 20 %
Welch & Griffith, No. 2....dis 40 %
Scales.—Fairbanks....dis 40 %
Screws.—
American Flat-Head Iron....new list, dis 55 & 10 %
American Flat-Head Brass....new list, dis 55 & 10 %
American Round-Head Brass....new list, dis 55 & 10 %
American Round-Head Iron....new list, dis 50 & 10 %
Grilley Round Head Nickel Plated Common..dis 50 %
Scythes.—Clippers, in boxes....₱ doz $8.75
Shaves.—Kimball's....₱ [illegible]
Watrous....dis 40 %
Shears.—American Shear Co., new list....dis 50 %
Shot.—Tatham's....[illegible]
Shovels.—O. Ames, new list....dis [illegible]
O. Ames, other brands, new list....dis [illegible]
M. B. & D....dis [illegible]
Sinks.—Magee Patent....dis [illegible]
Snow Shovels....dis [illegible]
Skates.—Union....dis 40 %
Acme....dis [illegible]
Imperial Club list No. 5, $3.75 ₱ pair list No. 7, $5.00 ₱ pair....dis [illegible]
Stocks and Dies.—King's....dis 40 %
Tacks.—
Swedes Tinned....dis 20&10 %
Swedes Iron....dis 30 & 10 %
Gimp and Lace....dis 30 & 10 %
Copper Tacks....dis 30 & 10 %
All balances on list....dis 35 %
Traps.—Oneida, Genuine....dis 10 %
Oneida, Imitation, H. & N....dis 40 %
Blake's....dis 40 %
Vises.—Simpson's Adjustable....dis 25 %
Howard Vise Co....dis 25 %
Prentiss'....dis 25 %
Weather Strips.—Packer's....₱ doz [illegible]
Browne's Flexible Rubber....dis 25 %
In 25 feet boxes; No. 1, ⅜ in. wide, ₱ yard. 10c; No. 2, ⅝ in. 12c; No. 3, [illegible]
Black Walnut Spring Weather Strips....₱ doz [illegible]
Window Springs.....dis 33⅓ %
Babcock's No. 1....₱ gross $12.00
Babcock's No. 2....₱ doz [illegible]
Wire Cloth.—"Clinton"....[illegible]
Wire Fence.—Scutt's Patent, Painted....₱ lb [illegible]
Scutt's Patent, Galvanized....₱ lb [illegible]
Wire Goods.—Gate Hooks and Eyes, &c., dis 50&10 %
Wrenches.—A. G. Coe's....dis 40 %
Girard Mfg. Co....dis 40 %
Girard Agt....dis 40 %
Wringers.—
Novelty No 2 for Common Tubs....₱ doz [illegible]
Novelty "3"....₱ doz [illegible]
Excelsior E "Stationary Tubs"....₱ doz [illegible]
Excelsior F....₱ doz [illegible]
Excelsior A with Folding Bench....₱ doz [illegible]
Excelsior B....₱ doz [illegible]
Novelty Set Tub. F....₱ doz [illegible]
Keystone, Wood Frame No 2½....₱ doz [illegible]
Keystone, Iron Frame No 2½....₱ doz [illegible]
Zinc....₱ lb [illegible]

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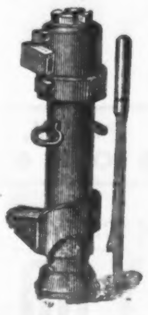

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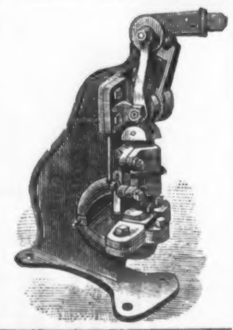

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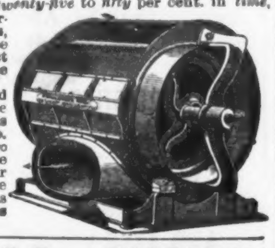
This Cupola has made a great revolution in melting Iron. It differs from all others in having a CONTINUOUS TUYERE, or in other words, the blast enters the fuel at all points. Above one ton capacity per hour, they are made *oval in form*. This brings the blast to the center of the furnace with the *least resistance* and *smallest* possible amount of power, and in combination with the continuous Tuyere causes complete diffusion of the air throughout the furnace, and uniform temperature, melting *ten* or *fifteen tons* an hour with the pressure of blast required to melt *two* or *three tons* in an ordinary Cupola. It also enables us to save very largely in *time* and *fuel*, the experience of our customers showing a gain of *twenty-five* to *fifty* per cent. in *time*, and *twenty-five* to *forty* per cent. *fuel* over the ordinary Cupola, and a BETTER QUALITY OF CASTING, especially in light work. This is due to the thorough diffusion of the air and more perfect combustion, extracting less carbon from the iron, making a softer and tougher casting.

We manufacture these Cupolas of any desired capacity, numbered from 1 to 20, inclusive, the numbers indicating the melting capacities in TONS PER HOUR—No. 1, one ton,; No. 2, two tons; No. 3, three tons per hour, and so on up to 15, or 20 tons. We have *improved* the *construction* of these Cupolas in every way, have increased their strength and durability, and sought to make them as convenient for working and repairs as our own and the experience of our customers could suggest



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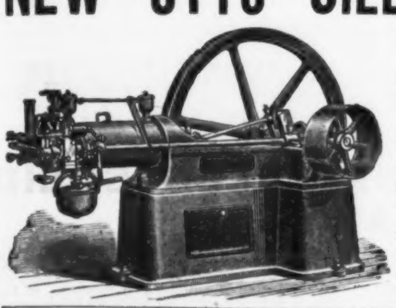

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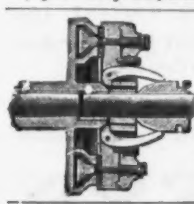

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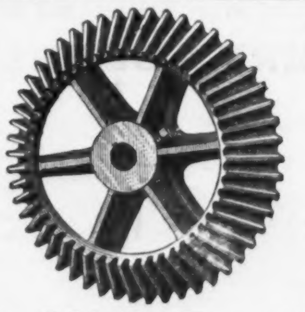

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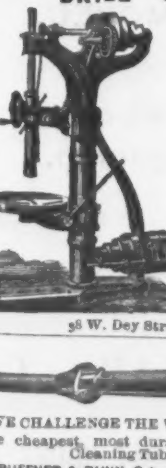

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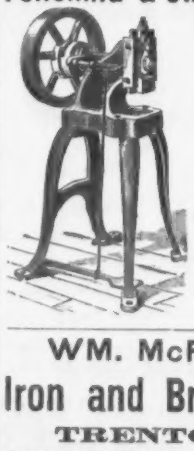

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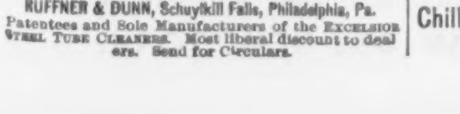

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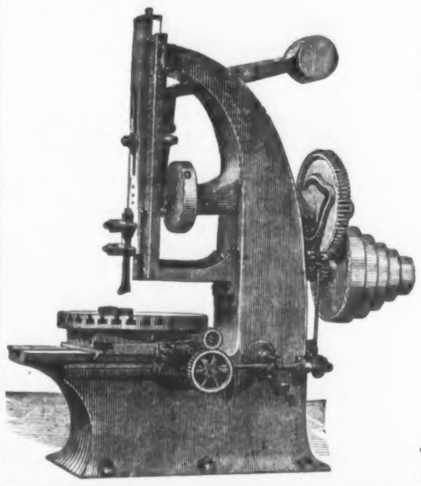

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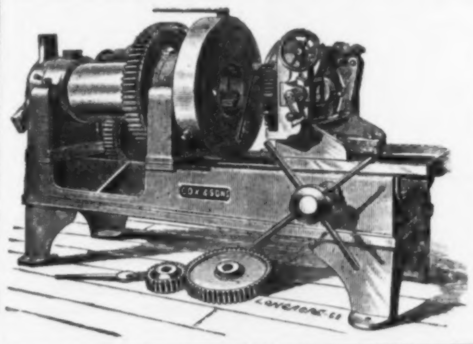

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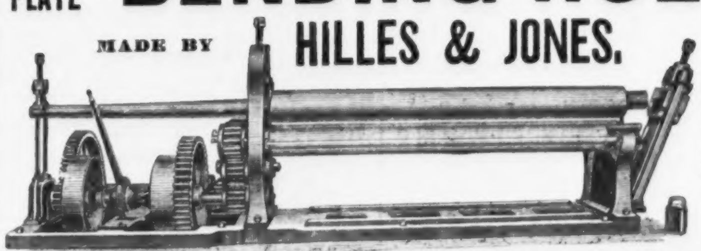

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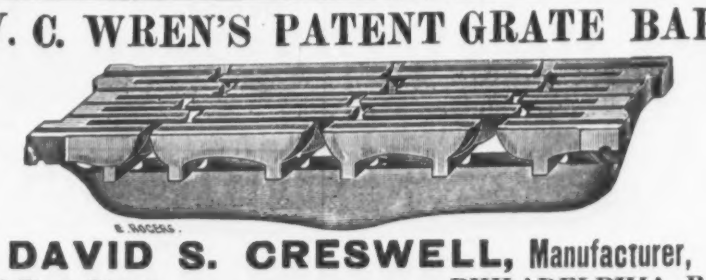

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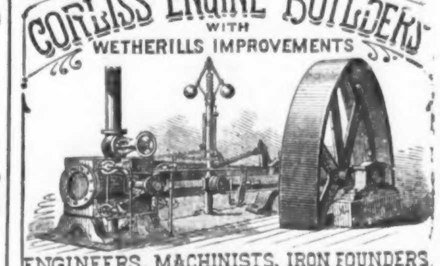

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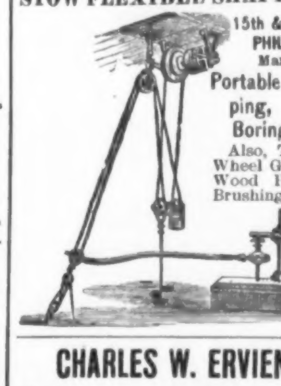

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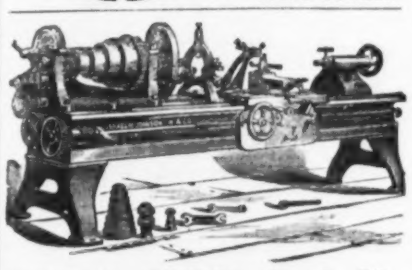

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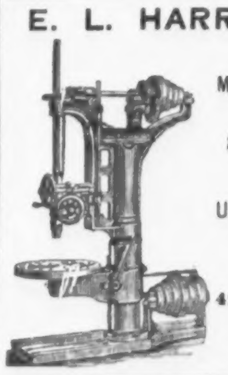

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